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AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

AUGUST 21, 1937

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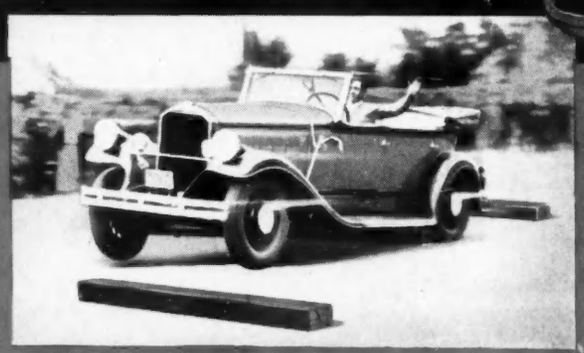
BENDIX

HYDRAULIC *Steering* STABILIZER



Over Railroad Ties at 70 Miles an Hour! Hands Off Steering Wheel! No Swerving! Full Steering Control!

INSTALLED IN 20 MINUTES

Banishes blow-out hazards!

Briefly, Bendix Hydraulic Steering Stabilizer makes any steering gear virtually irreversible, yet it does not interfere with steering in any way. Applicable to any car, truck or bus, whether with conventional axle or individual springing. Low in price. NO SERVICING NEEDED. Write:

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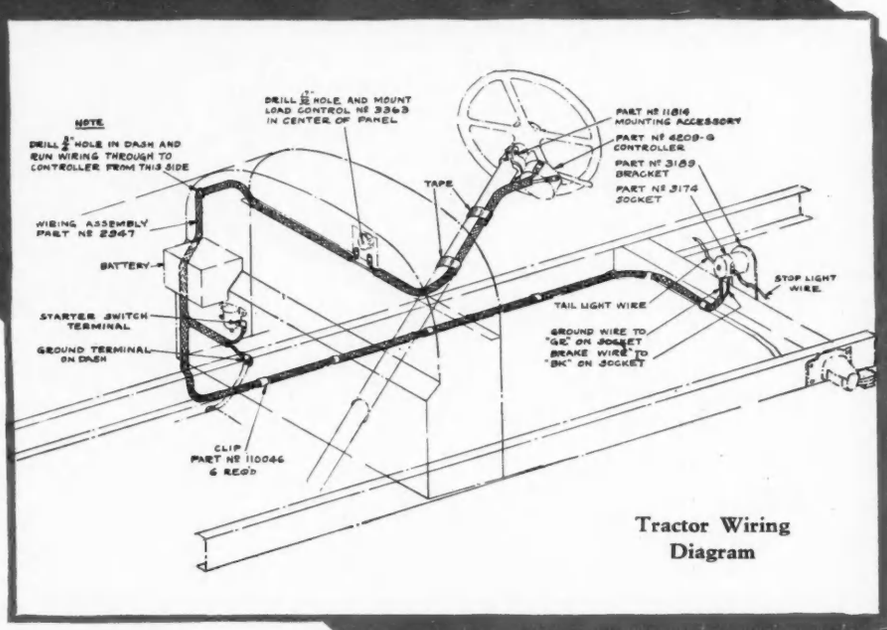
Bendix Manufactures: Bendix Mechanical and Hydraulic Brakes • Bendix B-K Power Braking • Stromberg Automotive Carburetors • Bendix B-K Vacuum Door Control • Bendix Hydraulic Steering Stabilizer • Bendix Automatic Clutch Control • Bendix Finger-Tip Gear Control • Lockheed Hydraulic Brakes • Zenith Carburetors; Flame Arresters; Fuel Filters • Bendix-Scintilla Automotive Magnetos • Bendix-Westinghouse Automotive Air Brakes, Air Steering, Air Gearshift, Air Clutch Control and Air Horns • Bendix Starter Drive • Bendix-Feragen Chassis Testing, Inspecting and Corrective Equipment • Bendix-Peco Tire Treatment Equipment Bendix Startix—Automatic Starting • Bendix "Convac" Vacuum Pump • Bendix-Weiss Rolling Ball, Constant-Velocity Universal Joint Bendix-Eclipse Brake Linings • Jaeger Electric Chronometric Tachometers • Standix Cartridge Lubrication Equipment, etc., etc


NOTE
DRILL ⅝" HOLE IN DASH AND RUN WIRING THROUGH TO CONTROLLER FROM THIS SIDE
DRILL ⅝" HOLE AND MOUNT LOAD CONTROL Nº 3363 IN CENTER OF PANEL
PART Nº 11814 MOUNTING ACCESSORY
PART Nº 4209-G CONTROLLER
PART Nº 3189 BRACKET
PART Nº 3174 SOCKET
TAPE
WIRING ASSEMBLY PART Nº 2947
BATTERY
STARTER SWITCH TERMINAL
GROUND TERMINAL ON DASH
STOP LIGHT WIRE
TAIL LIGHT WIRE
GROUND WIRE TO "GR" ON SOCKET
BRAKE WIRE TO "BK" ON SOCKET
CLIP PART Nº 110046 6 REQ'D

Tractor Wiring Diagram

All that is Required on the Towing Vehicle

Just a controller clamped to the steering post — a hole drilled thru the dash for wiring and to mount the Load Control — a wire attached to the starter switch and ground terminals. Then a socket for connecting cable and attach wiring for brakes and lights. *That's all!* Everything else is installed *on the trailer.*

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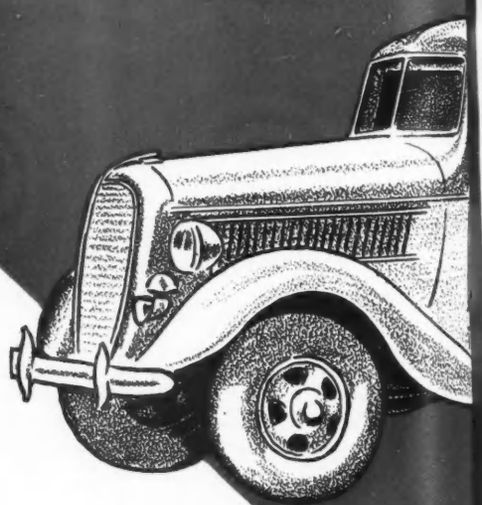
Electric Brakes have now been adopted for tractor-trailer service by many leading companies—such as the Pure Oil Company, all subsidiaries of The American Telephone and Telegraph Company, The Curtis Publishing Company, Commonwealth Southern Corp., Penn. Power & Light Company, Standard Oil Co. of Ohio, the United States Army, and many others.



WARNER *Electric* BRAKES

THE ONLY POWER BRAKES DESIGNED EXPRESSLY FOR TRAILERS

AUTOMOTIVE INDUSTRIES
AUTOMOBILE

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Published Weekly

Volume 77 Number 8

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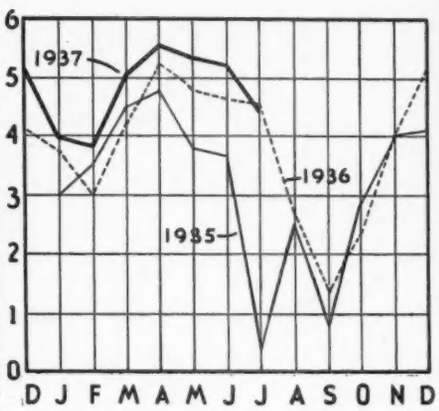
AUTOMOTIVE PRODUCTION*

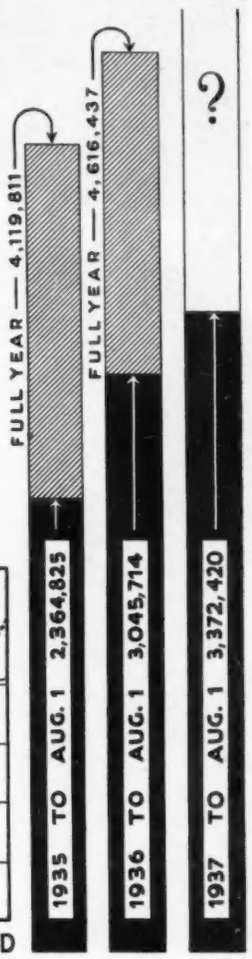
Passenger Cars and Trucks —U. S. and Canada

Bar charts at the right represent total production to Aug. 1st of year indicated.

Numbers at left of monthly graph below show production in 100,000's.

*From Department of Commerce Report and Automobile Manufacturers' Ass'n.





Ideas In Zinc

With experience accumulated through recent years, zinc alloy die castings are now entering a phase of usefulness which is the inevitable result of their remarkable development and acceptance. No longer is this modern metal and process confined to the well known body hardware, ornamental parts, carburetors, and other applications visible to the eye or hidden under the hood. The trend now is toward applications that require structural strength where the useful zinc alloy supersedes the more commonly used materials of moderate strength.

One of the most spectacular of these is the Bendix-Weiss constant velocity universal joint which finds use in transmitting power to drives requiring a much greater angularity than the conventional universal joint can handle. In this application, the zinc alloy die casting serves as the matrix joining the steel hub and yoke to the hardened steel bearing races. The die cast joint is said to have strength comparable to that of the same size conventional type, and the manufacturer claims it has proved to be amply strong to stand heavy overloads, shock loads, fatigue, and low temperatures. Thus has been uncovered still another field of activity for the high-strength, stable Zamak alloys based on Horse Head Special Zinc of 99.99+ per cent purity. The New Jersey Zinc Company, 160 Front Street, New York City.

Idea No. 3

More accurate heat treatment with VisControlled Steel

BY the time parts reach the heat-treating department, they carry with them a heavy investment of time. Hence failure of the steel here—failure of individual pieces to respond to a mass-production heat-treating cycle—means more than just the loss of material.

VisControl, a Bethlehem development, enables us to produce—heat after heat—a steel which responds to heat treatment with remarkable uniformity. This uniformity is an outstanding characteristic of VisControlled Steels—uniformity not only in analysis and grain size, but also in certain other qualities that play a hidden yet important part in heat treating. Qualities influenced by such technical considerations as oxidation of the steel as it is being refined; amount and accuracy of finishing additions.

Practically all Bethlehem steel—for forging, machining, heat treating or other processing—is now made under this exclusive process. Try this steel—see if you don't find, as others have, a marked improvement in the quality of your product along with a material reduction of rejections.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Published Weekly
Founded 1895

AUTOMOTIVE INDUSTRIES

August 21, 1937
Vol. 77, No. 8

Third Quarter Output to Top 1936

Heavy Production at End of Model Year, Short Retooling Period to Bolster August and September Assemblies

Current quarter's production by the automobile industry will run considerably higher than in the third quarter. Last year despite the 1 per cent drop in July output from that of a year ago which was accounted for by the Ford inventory closing. Most companies maintained heavier operations to the end of their model runs than they did in 1936, and this year's shorter retooling period will help production figures for the balance of the quarter.

Only tentative schedules of leading companies are available for September but if the plants are reasonably successful in getting under way on new programs, the industry should have little difficulty in beating the September, 1936, output of 139,820 cars and trucks. August, however, is expected to contribute the major portion of the current quarter's gain over the corresponding period last year, with indicated output of around 360,000 units compared with 275,934 in August, 1936. The third quarter's total should run well beyond 900,000 units and may exceed 925,000 depending largely upon when the Ford plants can resume in volume. This compares with a total of 866,960 vehicles built in the third quarter of 1936.

Ford Motor Co. expects to complete its 1937 production program before the middle of September which, from the production standpoint, closes the model year for the industry. Just as a year ago, Ford will be the last to wind up the old program but the finish will come a week to 10 days earlier than in 1936 when Ford plants went down during the week ended Sept. 24.

The following plants are now out of production on 1937 models: Packard, Studebaker, Nash, Lincoln-Zephyr, Pontias, Oldsmobile, Buick, Cadillac-LaSalle and Hudson. Two Chrysler divisions expect to finish production next week.—H. E. G.

During the first ten days of August, Pontiac dealers delivered 7929 new cars compared with 5057 for the first ten days of July and 4335 for the first ten days in August of last year. This figure exceeds

(*Turn to page* 243, *please*)

Price Rises Drive In Many Car Sales

Advance notice of price increases sent out to dealers by a number of companies last week resulted in a sales spurt as prospective buyers rushed in to take advantage of old prices. Reports from the field indicate a lift in deliveries all along the line. No doubt the crowding in of deliveries before the deadline will have a depressing effect on figures for the next reporting period so that a true gauge of the public's reaction to the new prices probably will not be available for some time. The point of particular interest to the industry is whether the dealers as a general thing will take advantage of the chance to improve their earnings, or whether they will shade the price increases by raising allowances on used cars.

U.S. Cars Gain Abroad

Sales in Overseas Markets Up 28% in Half Year

Sales of American motor vehicles in overseas markets *during the first six months of this year totaled 376,465 units, a gain of 28 per cent over the same period last year, the Automobile Manufacturers Association reported.

Demand for passenger cars rose to 247,199 units, an increase of 24 per cent, with the Union of South Africa, Australia and Belgium occupying the first three important market positions.

Truck sales numbered 129,266 units, an increase of 36 per cent, with Japan

(*Turn to page* 239, *please*)

Competition for UAW Expected

Alliance of Independent Unions and New Drive by AFL Seen Factors in Status of Automobile Organization

Growing competition for the United Automobile Workers union is seen in recent developments in the labor world which suggest that the coming year may be marked by inter-union struggles with less pressure on employers. One thing is quite apparent. The UAW and its parent organization, the CIO, are fast losing much of the arrogance that characterized their sudden rise to power during the past year when there was little or no opposition from competing organizations in the automotive field. But now it is beginning to appear that the UAW will face formidable competition in the form of a union of independents as well as in greater activity on the part of the American Federation of Labor.

Last week in Detroit, representatives of 30 independent labor unions selected members of a planning committee which is to meet Aug. 21 to work out an alliance of independent unions in such a manner "as to gain national expression and recognition." Principal speakers at the preliminary meeting last week were J. J. Griffin, president of the Tool and Die Craftsmen: W. E. Evans, president of the National Coalition of Labor Organizations, Inc.; and Daniel M. Robbins, president of the American Labor League with headquarters in Saginaw. The independents feel the need of a national organization to obtain proper recognition. Delegates at the meeting claimed a membership for their organizations of approximately 70,000 and that the prospective alliance would represent 150,000 workers.

This week in Flint, the American Federation of Labor opened regional headquarters announcing the appointment of Raymond W. Bellamy of Washington, former Federal director of employment for Maryland, as director. Bellamy started immediately to enroll automobile workers and predicted that the Independent Automobile Employes Association, recently organized in Flint and claiming several thousand members, would become an affiliate of the AFL. A few months ago the Federation opened an office in Toledo for organizing automobile workers.

(*Turn to page* 238, *please*)

Acme Photo

THE WINNAH! Bobby Ballard, White Plains, N. Y., sets new speed records in winning the Soap Box Derby at Akron, O., on Aug. 15. Bobby, now a top-ranking racing driver at the age of 12, is here receiving congratulations from Felix B. Doran, Jr., assistant sales manager, Chevrolet division, General Motors Corp.

Soap Box Derby Time 28.348 m.p.h.

Bobby Ballard, White Plains, N. Y., Wins Fame and Fortune With $9.82 Hand-Built Record-Breaking Job

A trim little powered-by-gravity hand-built racer that cost $9.82, a firm grip on the steering wheel, a clear eye and an abundance of pluck and grit brought both fame and fortune to 12-year-old Bobby Ballard of White Plains, N. Y., in Akron, Sunday, Aug. 15, when he won both the All-American and the International Soap Box derbies and set a new course record of 28.86 sec. for the 1200-ft. race or 28.348 m.p.h. He defeated a British South African boy in the latter.

For Bobby a four-year college scholarship in any recognized state college or university is assured through the Chevrolet division of General Motors Corp. in co-operation with more than 120 of the nation's leading newspapers. As first-place winner in the national event, participated in by 120 city winners over the United States, Bobby will, some six years hence, enroll in the University of Minnesota, by virtue of his splendid showing in the national event today. The northern school is Bobby's own selection.

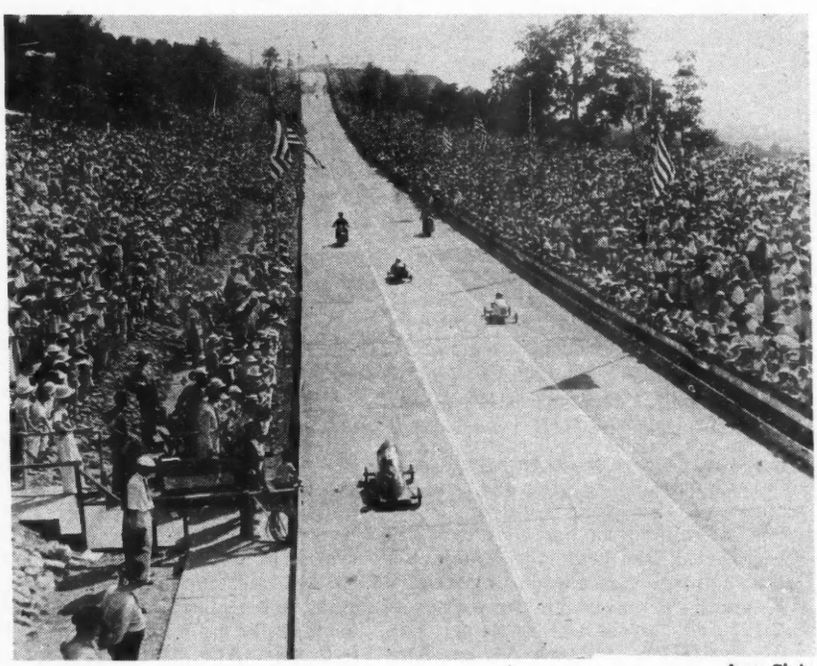
In addition to the scholarship, Bobby also was awarded the first-place national silver trophy, the classically designed M. E. Coyle award. A diamond-set gold medat also was a part of the prize list for Bobby. As a special award for the national champion, whose speedy little racer dominated the juvenile classic throughout, the twelve-year-old youth received the Chevrolet silver trophy for the fastest heat of the day.

C. P. Fisken, advertising manager of Chevrolet, presented the derby prizes at a banquet which followed the races. Each of the 120 derby contestants—each a champion over hundreds of boys in his home city—was given a prize.

The outgrowth of a neighborhood soap box derby race in Dayton, O., in 1933, the Soap Box Derby has become the major juvenile amateur sporting event in the world. More than 100,000 boys in home-built racers costing a maximum of $10 each, competed in the preliminaries in 120 American cities and three foreign cities. The Akron *Beacon Journal* was host to the derby contestants.

Many special awards were presented the young finalists. Among them were the C. F. Kettering Award for the best-designed car, which went to Robert Bennett, Jamaica, L. I., N. Y. The Chevrolet silver trophy for the best upholstered car, won by Billy Kindrick, North Little Rock, Ark.; the Chevrolet silver trophy for the best designed brakes, won by Waldron Stemm, Scotia, N. Y., and the fastest heat award to Ballard. But the less successful derbyists were not forgotten. To each of them individually went a soap box derby wrist watch as well as a driver's diploma.

An enthusiastic, jovial crowd poured into Derby Downs for the fourth annual running of the juvenile sports event of the year. Estimated at more than 120,000, the crowd packed bleacher and reserved seats, as well as special sections. Many lined the fences at either end of the course, while hundreds viewed the race from a hillside overlooking the track.



Acme Photo

INTENSE is the interest of this huge crowd of over 120,000 which saw speed records shattered in the Soap Box Derby at Akron, O., on Aug. 15. Equally intense was the competition. Here are three of the hand-made racing jobs roaring down the 1200-ft., specially built concrete slope. The track was patrolled by motorcycle police.

New Bantam Cars Redesigned

R. S. Evans Reveals Details of 1938 Line; One Passenger, Three Commercial Bodies Planned Now; Distribution Arranged

In an exclusive interview with the Detroit editor of CHILTON PUBLICATIONS,, R. S. Evans, president, American Bantam Car Co., Butler, Pa., disclosed engineering details of the new Bantam car and described plans for its distribution. As mentioned in AUTOMOTIVE INDUSTRIES July 24 1937, the financial set-up has been completed and the company is proceeding to complete the final details of design and production. The company is pointed for a minimum volume of 10,000 units and is prepared to increase the schedule as required.

Application has been made for space at the National Automobile Show in New York and the entire line will be exhibited there, if it is not too late to get suitable space. In any event, the line will be shown in Chicago and at the Newark Truck Show. The Bantam line will consist of one passenger car model—the coupe—and three truck models—quarter-ton chassis, quarter-ton pick-up express, quarter-ton panel express. Some time later in the year the company intends to announce a new roadster.

The company will merchandise the line in conventional fashion through dealers and a limited number of distributors. Dealers preferably will be those who can handle this line in addition to a non-competitive line rather than exclusive Bantam dealers. Delivered price will be in line with previous practise. The standard coupe will deliver at least 15 per cent lower than the lowest priced car on the market.

So far as design is concerned, the car is being completely modernized and redesigned throughout. Although but slight modifications will appear in the lines of the coupe body shell, the hood, grille, and fenders will represent the latest styling motif. The rear end will have the modern rakish effect by the use of an apron below the back panel, mounting the spare tire in a recess.

Frame, engine, sheet metal, and many other mechanical details will be produced at the Butler plant. Although the body stampings are being made by Hayes, all body assembly, trimming, and paint will be done at Butler. The engine has been materially changed for improved performance. Bore and stroke and outward appearance remain the same. However, the makers will use an aluminum alloy cylinder head with a 7 to 1 compression ratio. Brake horsepower has been increased from 13 to 19. The lubrication system has been completely changed. The two crank main bearings, formerly ball bearings, have been changed to babbitt bearings of the same diameter.

The frame is new with a V-bracing member to accommodate a change in springing. The transverse spring formerly used is retained at the front but semi-elliptic springs now are used at the rear, providing a Hotchkiss drive. Engine and transmission will be mounted on rubber. Special small diameter low pressure tires have been developed by Firestone for the new line. They take only 16 pounds air pressure. Wheelbase remains at 75 in. with narrow tread as formerly.

Goodrich Election Date Set

The National Labor Relations Board has set Aug. 26 as the date for an employes' election at the B. F. Goodrich Co.'s Akron, Ohio, plant. The issue is sole bargaining powers for the union which sought the election, the United Rubber Workers Union of America. This follows by only two days the scheduling of an election for Aug. 24 by the Akron plant workers of the Goodyear Tire & Rubber Co. The union preferred the elections to hearings by the National Labor Relations Board. Goodrich officials agreed to the date set.

Bendix Consolidation

The consolidation into the Bendix Aviation Corporation of the Bendix Products Corporation, marks one step in the development of the management's new policy which contemplates the combining of all the Bendix subsidiaries into one corporate family by Jan. 1, 1938.

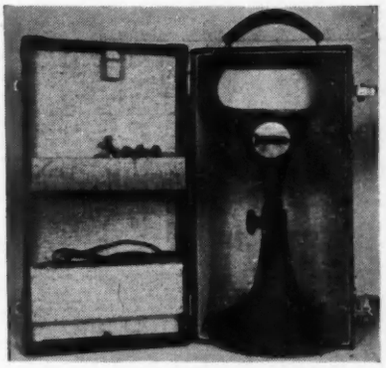
The present program calls for the establishment of a finance committee which must pass on all expenditures of all the various divisions; for the reduction, at least for the time being, of amounts spent on research and experimental work, and for the close concentration of related activities into segregated groups.

"Night-Blindness" Test

Develop Device to Show Eye's Reaction to Darkness

Perfection of a machine to test automobile, bus and truck drivers for "night-blindness" is announced. Thousands of persons have already been examined with its aid and the Commonwealth of Pennsylvania is to cooperate by sending drivers who have been involved in night accidents for testing. The inventors are Dr. J. B. Feldman and Dr. W. J. Ezickson, both of Philadelphia.

Basis of the development is the relationship of night-blindness, or impairment of vision at night, often manifested by slow readjustment to darkness after facing bright light, to the quantity of Vitamin A in the body. The doctors found that speedy regeneration of "visual purple" is essential to readjustment of the eyes to darkness after light, and that Vitamin A is necessary to such regeneration after the visual purple has been bleached out by light.



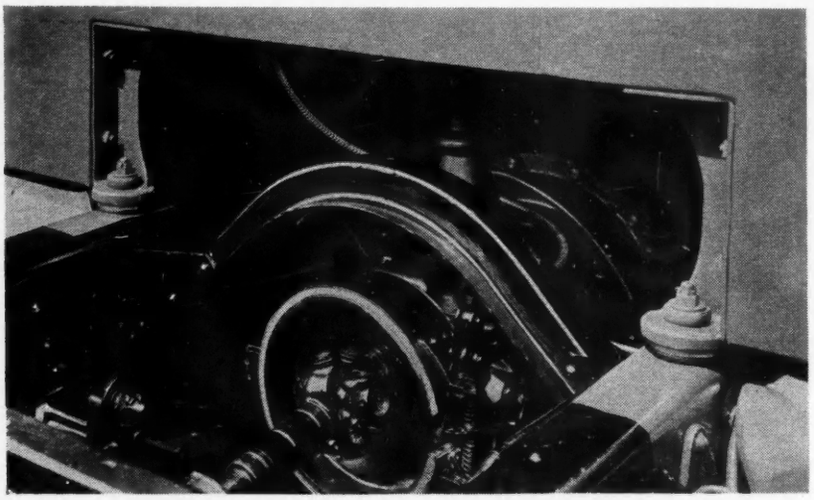
TESTER for automobile drivers who may be subject to "night-blindness." The lighted screen at the top bleaches "visual purple" from the subject's eyes. Length of time he takes to be able to see the movements of the illuminated arrow just below, after the screen is darkened, provides a measure of the regeneration—time of the visual purple which controls vision at night.

The device which tests the speed of adjustment of the eyes to darkness will therefore permit a report on the deficiency of Vitamin A. The only other factor which can cause night-blindness is some disease of the eyes. Second tests with the machine after an interval of a few weeks for treatment with Vitamin A concentrate are used to determine whether the night-blindness was caused originally by lack of Vitamin A or by some pathology.

The device consists of a well-lighted ground glass before which the subject is seated for three minutes in order to bleach out the visual purple. When the light is extinguished, there is automatically lighted below it an illuminated arrow. Position of the arrow can be changed by the examiner. It is stated by the doctors that not more than five minutes should elapse between the extinguishment of the bright light before the subject can see the arrow and clearly note its movements. A determination can be made in 10 min.

Results of night-blindness are many. Car drivers may strike objects which they do not see until they are practically on them or may be blinded for long seconds after facing headlights and may well run into nearby objects. Or they may be found driving in the center of the road because they cannot see ditches or objects and therefore fear the road margins.

Night-blindness is curable if it is traceable to lack or deficiency of Vitamin A. It may be curable if the other troubles which cause it are subject to treatment.



RUBBER - INSULATED cabs feature the new Diamond T cab-over-engine models, shortly to make their official appearance. Firestone Tire & Rubber Co. developed the mountings which are intended to relieve the driver of fatigue by absorbing vibration. General arrangement of the engine and transmission front springs and cab mountings are shown above. Five models will be offered.

Competition for UAW

(*Continued from* 235)

Meanwhile in Milwaukee, lines are being drawn for the battle on the convention floor between factions within the UAW. President Homer Martin has the support of both sides for his reelection but the factions are sharply divided on other issues, such as centralization of control, greater autonomy for locals, size of the executive board, political action and the reelection of certain officers. On Martin's side in the so-called "progressive group" are Richard T. Frankensteen, organization director, and Walter N. Wells, third vice-president. They are seeking to oust vice-presidents Ed Hall and Wyndham Mortimer, leaders of the "unity party," which has the support of Walter Reuther, board member and president of the West Side Local in Detroit.

The convention will get under way in Milwaukee Aug. 23 with both factions claiming a majority of the 1500 or more votes of delegates expected to be present. The executive board has been in session two weeks, drafting recommendations on constitutional amendments and other questions. One subject which is certain to be debated at length is that of outlaw strikes and the disciplinary problem they have raised.

In a statement addressed to all members and officials of the union, Homer Martin called attention to the fact that the only part of the UAW agreement with General Motors which expired on Aug. 11 was that covered by the exclusive bargaining paragraph which was limited to six months, under the supervision of Gov. Murphy. "Our present agreement," he said, "will continue in force and there is no limit to the time it shall continue. It may be changed by 60 days' notice."

Labor Developments

At Belding, Mich., a union organizer was driven from the city. Walter Truman, Midwest district manager for the American Federation of Hosiery Workers, told the sheriff he had been forced to leave town under threat of tar and feathers. He had been investigating the lay-off of union workers by the Union Belding hosiery mill.

After extended conferences, the UAW was granted exclusive bargaining rights, increased wages and shorter hours by the New Haven Foundry at Mt. Clemens, Mich. The plant, which employs 700 persons, had been working on a temporary agreement after a recent sit-down strike.

The Bay City Steel Casting Co. plant was closed by a walk-out Aug. 12 which union men said was caused by the discharge of a fellow worker. The plant employed 115 men.

The United Rubber Works Union of America, of the CIO will meet an acid test of its strength in Akron, Ohio, Aug. 24. On that date the first National Labor Relations Board election to be conducted in the rubber and tire industry on the issue of sole bargaining, will be staged by Akron production employes of the Goodyear Tire & Rubber Co., focal point of the URWA negotiations for sole bargaining recognition in the tire industry. Announcement by James P. Miller, regional NLRB director, that the election would be held Aug. 24 followed conferences with Goodyear and union attorneys, and forestalled scheduled hearing Aug. 16 in Akron by the Labor Board on petition of the Goodyear URWA local that it be certified as the sole bargaining agency for all Goodyear employes.

GM Denies Parts Monopoly Charge

A. M. Levert, Counsel at Oshkosh, Wis., holds No Proof of Dealer Coercion Shown as Yet; Backs "Genuine Parts" Rule

A formal denial of charges preferred by the Federal Trade Commission against General Motors Corporation, General Motors Sales Corporation and various subsidiaries, that they are engaged in unfair competition and practices tending to create a monopoly in the sale of automotive parts, accessories and supplies, was made by Albert M. Levert of New York, counsel for the GM interests, at the fourth hearing conducted at Oshkosh, Wis., Aug. 12 and 13, by John L. Horner, presiding examiner.

Mr. Levert conceded that GM requires its dealers to use genuine GM parts in replacements on GM cars, but insisted that this is done entirely for the protection of owners. Moreover, he said this has the approval of the Supreme Court of the United States, citing the decision in the case of the Pick Mfg. Co., West Bend, Wis., manufacturer of replacement parts, in which the court held that "the automobile being a complicated mechanism, replacement parts must be accurate and of proper mechanical construction, otherwise disaster may result."

Mr. Levert at Oshkosh also entered formal denial of the charge that GM dictates to its dealers under threat of cancellation of franchises, and said that at all hearings so far held, namely, in Detroit, Chicago, Milwaukee and Oshkosh, no proof of this allegation had been produced. He said all GM dealers are free to conduct their business as they see fit, but that as a protection to owners of GM cars the company insists on the use of genuine parts and that this is a reasonable premise. Mr. Levert pointed out that in hearings so far held, jobbers who testified concerning difficulty in selling GM dealers parts, accessories and supplies which also are produced by GM, admitted on cross examination that they are able to sell these dealers other equipment and supplies.

In opening the Oshkosh hearing, Examiner Horner announced that while the testimony being taken in the various localities will be used in formulating the final decision, no individual claims can be regarded as conclusive proof of the charges. He said that in other words evidences of unfair practices will have to be found a general condition over the country, and isolated instances will not be final.

Oshkosh Hearing

R. W. Hart, president of the Hart Auto Supply Co., Oshkosh, wholesale garage equipment, parts and equipment, was the principal witness at the Oshkosh hearing. His examination was mainly in indirect substantiation of the commission's allegations. Mr. Hart testified that throughout his northeastern Wisconsin sales territory

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U.S. Cars Gain Abroad

(Continued from page 235)

as chief purchaser, followed by Belgium, Mexico and Argentina.

* This figure is different from the figure for exports shown in Automotive Industries, issue of Aug. 14. The latest figure includes foreign-made and foreign-assembled American cars as well as direct exports of cars and chassis.

GM Export Sales Increase

Sales of General Motors cars and trucks to dealers in the overseas markets during July totaled 31,341 units, representing an increase of 23 per cent over the volume in July of last year.

In the first seven months of 1937, sales of 219,162 units represented an all-time high volume for that period, and an increase of 10.2 per cent over the volume in the first seven months of 1936. For the twelve months through July, 1937, sales totaled 344,959 units, an increase of 10.7 per cent over the volume in the twelve months ended July 31, 1936.

July Car Sales Top June

New passenger car sales in the United States for the month of July are running 4.41 per cent higher than June, on the basis of reports from 20 states, according to the R. L. Polk & Company report, issued today. New car registrations in the 20 states total 93,495, the report shows. The Polk report estimates total July sales at 365,000.

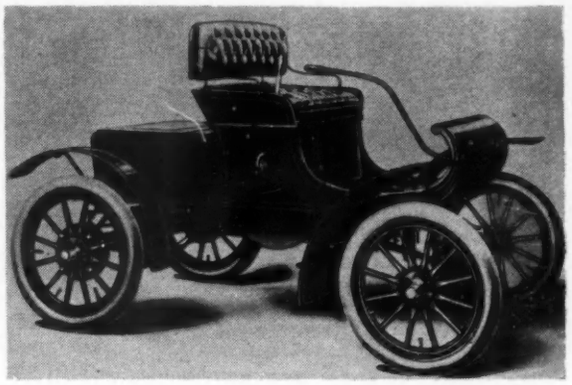
Truck and commercial car sales in 20 states total 17,826. This total is 13,51 per cent higher than the 15,704 sales reported for the same number of states in June and is minus 10.60 per cent compared to July of last year. The truck sales estimate for the United States in July is 6,000.

Tool Orders Dip Again

National Machine Tool Builders' Association reports that its index of orders July was 171.1, the third month of downtrend but still above the February low of 165.2. Both figures are compared with 1926 monthly averages as 100. The 1937 figures have been above the period November, 1929, to November, 1936, excepting for February. Foreign demand at 55.7 is still holding up and accounts for a third of the business. Foreign business is the highest since a separate record of its volume was begun.

GM New Zealand Adds to Plant

General Motors New Zealand, Ltd., is spending about $200,000 on additional buildings and improved production facilities, it was announced upon the departure for the United States and England of J. Coates, production manager, who will study the latest methods in use. The demand for the company's product has exceeded its production facilities. L. C. Fitzgerald, Detroit engineer, will supervise the construction work. One of the features will be the doubling of the length of the production line.



OFFICIAL description of the first Oldsmobile stated that "the machinery is very simple, not even a counter-shaft being used in its construction; it is practically noiseless and impossible to exp'ode, as the fuel supply is below the engine."

Olds Has Fortieth Anniversary

Formed Aug. 21, 1897, to Build One Carriage; Built 2500 In Its Fifth Year; Famous Names Appear in Its History

"To build one carriage in as nearly perfect a manner as possible," was the authority given the head of an automobile company formed just 40 years ago, Aug. 21, 1897. That company, formed on that date, is now Oldsmobile. By its fifth year, production was 2500 cars.

The company's own description of its first automobile was as follows: "Underneath the box, and in every way independent of it, is a 5 h.p. gasoline motor, which in operation makes scarcely any vibration. The vehicle is steered with the left hand. The lever at the right of the buggy, when thrown forward, throws in the back gear; when turned in the opposite direction a fourth of a turn it throws in a four-mile speed, which is used for rough roads and hill climbing. If higher speed is desired another quarter turn gives eight miles an hour, still another is 12 miles an hour, and if still greater speed is desired the speed is increased at the governor of the motor and as high as 18 miles can be obtained."

These first curved-dash Oldsmobiles went all over the world, becoming the property of crowned heads of Europe and small town merchants alike.

Many of the outstanding figures of the automobile industry have been at one time or another connected with the Oldsmobile company.

The Dodge Brothers laid the foundation of their fortune through an order for 2000 transmissions placed with their little machine shop by Oldsmobile. In the same manner, the Cadillac Company, headed by Henry M. Leland, attributed its early growth to an order for 2000 engines, placed by Oldsmobile with the Leland-Faulconer Company, of which Leland was president.

Ransom E. Olds, from whom Oldsmobile derived its name, later organized the Reo Motor Car Company. The late C. B. Wilson, recently prominent in the Willys organization, was responsible for organizing the Oldsmobile factories for their production of early days.

Roy D. Chapin, F. O. Bezner, Howard E. Coffin, R. B. Jackson and J. J. Brady were associated with Oldsmobile before they established the E. R. Thomas Company at Detroit. This company later became the Chalmers Company, and afterwards four of these five men started the Hudson Motor Car Company.

Ralph M. Owen, one-time factory manager of Oldsmobile, left the company to produce the first Owen car and later the Owen Magnetic. R. C. Hupp resigned his position as service manager of Oldsmobile to organize the Hupp Motor Car Company.

W. C. Durant acquired Oldsmobile for the General Motors Company (later the General Motors Corporation). C. W. Nash, who later formed the automobile company which bears his name, was once president of Oldsmobile.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

Motor Horse

After three years of constant experiment Joseph Barsaleaux, a blacksmith of Sandy Hill, N. Y., has invented a motor horse that is quite a curiosity. The horse does not move on legs, but on a single wheel about two feet in diameter. This wheel is attached to shafts, just as the live horse is. Over the mechanism constructed on an oblong support covering the top of the wheel is the frame of a horse. The reins are attached to the mouth of the horse, and when pulled cause the animal to turn in whatever direction the driver may desire.

Mr. Barsaleaux has attached his invention to a two-wheeled roadcart, with the thills attached to the sides of the horse, and has operated it with complete success. The sing'e front wheel is 27 inches in diameter and has a tire 4 inches wide. On this wheel is mounted an American gasolene motor. There are three sprocket chains employed, two running horizontally, while the third operates perpendicularly, running over a 13 inch sprocket attached to the front wheel and a 4 inch sprocket fastened to a shaft directly over it.

Six gear wheels operated by one shaft regulate the speed of the machine. At present Mr. Barsaleaux can run his machine two, four or six miles an hour, as he may desire, and expects to run the vehicle backward without reversing the engine.

From *The Horseless Age*, August, 1897.

UAW's Income Large

Was $1,075,000 for 15 Months to June 30; Spent $647,000

Income of the UAW during the 15 months since its last convention, to June 30 last, totaled $1,075,000, according to Secretary-Treasurer George Addes report prepared for submission to delegates at the Milwaukee convention opening next Monday. Of this amount, $912,600 was collected in the first half of 1937, the period of the union's most rapid growth. The union spent approximately $647,000 in 15 months for its intensive organization drive, leaving a balance of $428,000 in the treasury, of which $300,000 is invested in government bonds, according to the report. Salaries and expenses for the 228 officers, organizers, attorneys and office employes on the International's payroll during the 6 months of the current year, totaled nearly $208,000. Homer Martin's salary for the 15 months was $3,943 and his expenses were $6,833. Each of the five general officers received slightly over $3,500 salary during the period, in addition to substantial amounts for expenses.

Plant Notes

General Motors Corp. has awarded the contracts for its new Ternstedt division plant at Trenton, N. J. The buildings alone will cost $2,000,000. The new facilities are required to provide body hardware and parts for the growing Eastern production of cars. Work will start soon and by early next year, it is expected that 3000 will be employed in the new plant. The factory will occupy about 900,000 sq. ft. of floor space mostly on one story.

City Auto Stamping Co., Toledo, has awarded the contract for a second addition to its plant in recent weeks, providing it with an increase of more than 50 per cent in floor space for manufacturing, assembly and storage at its stamping plant. The newest addition to be built by H. J. Spieker Co., general contractors, will cost $150,000 and will add 35,000 sq. ft. It will extend a new wing started earlier this season. It is to be completed by Nov. 1. C. C. Bigelow, vice-president and treasurer, said the new construction was largely to give facilities to balance up the big press capacity of the company with better assembly and storage space. The company has been renting some outside space for storage.

NADA Warns on Dealer Loans

Sales finance companies are urged in a resolution adopted by the executive committee of the National Automobile Dealers Association to curtail the installment paying period in the sale of automobiles, and also to curtail the making of capital loans to dealers.

A. N. Benson, general manager of NADA, states that the general practice by dealers and finance companies of granting of long term financing, with low down payments, has reached a crucial point. The resolution said in part: "A merchandising industry can only be as strong as its merchants, and the practice followed by finance corporations in recent years in making capital loans to individuals for the purpose of establishing such persons as automobile dealers has resulted in a lowering of the caliber of many dealerships with the natural results that business practices of such dealers are in violation of sound business principles to a degree that it has been most injurious to the merchants with adequate capital and consequently injurious to the industry.

Sees Used Car Price Rise

A belief that used car prices soon may start an upward swing in keeping with the general increase in prices of all commodities was expressed by J. B. Wagstaff, general sales manager of the De Soto division of the Chrysler Corporation.

"A visit to almost any used car lot will reveal that hundreds of good, reconditioned used cars are now listed at 'bargain basement' prices," Mr. Wagstaff stated, "prices that stamp these cars as values that may not be matched for years."

Flight Analyzers Used

United Air Lines has purchased and installed 60 "flight analyzers," including the recording barograph and other features, on its fleet of Douglas and Boeing machines to provide automatic and constant record of various pertinent data on the operation of each scheduled flight. Purpose of the new devices is to provide both the ground supervisory officials and the pilots an accurate and complete picture of each trip that would not otherwise be possible. This marks the first installation of these devices on any airline in the world.

On a small chart, 3 inches by 5 inches in size, are recorded the altitude at which the plane was flown "from block to block," the rate of climb after take-off, the rate of descent prior to landing, the total time of the trip, the comparative smoothness of the flight at the cruising elevations, the amount of time the automatic pilot was controlling the ship, and the number of radio telephone reports from the plane to ground stations and the time each was made.

AAA Would Curb Lighted "Ads"

Congested highway, particularly in the vicinity of the large cities of the country, have a new menace to drivers in the form of hundreds of thousands of gaudy, glittering, flickering, shifting, illuminated advertising signs, the American Automobile Association charges. The national motoring body has appealed to the business interests of the country to stop this before public opinion compels legislatures to bear down

"The human eye can only absorb so much light. Reaction to and recovery from glare follow well-defined lines, though varying with the individual. Aside from the distracting effect of illuminated advertisements at night, there is no doubt at all that they affect the efficiency of the eye in coping with conditions on the road," the association says.

Auburn Acquires Fan Unit

Auburn Automobile Co. has acquired from the Russell Electric Co., Chicago, the trade name "Aerofan" and the goodwill and exclusive patent licenses on fans formerly manufactured by the Russell company.

Mack Truck Income Rises

Mack Truck, Inc., reported for the June quarter net income of $645,961 or $1.08 per common share, against $294,299 or 49 cents a share in the preceding quarter, and against $404,412 or 67 cents a share in the June quarter of 1936. For six months the net income was $940,260 or $1.57 a share, compared with $511,889 or 85 cents a share for the like portion of 1936.

GM Quits Shanghai

Cabled dispatches Aug. 19 reported the decision of General Motors of China to evacuate its head office at Shanghai and move it to Manila, P. I.

$750-$1,000 Cars Continue to Gain

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes*

	New Registrations				Estimated Dollar Volume			
	June		First Six Months					
	Units	Per Cent of Total	Units	Per Cent of Total	June	Per Cent of Total	First Six Months	Per Cent of Total
Chevrolet, Ford and Plymouth	203,927	56.63	1,167,859	58.52	$141,000,000	49.44	$808,000,000	51.25
Others under $750	5,737	1.59	28,823	1.44	3,300,000	1.16	16,450,000	1.04
$750-$1000	131,248	36.44	688,322	†34.49	114,800,000	40.25	601,300,000	38.14
$1001-$1500	16,784	4.66	95,386	4.78	20,200,000	7.08	114,900,000	7.29
$1501-$2000	1,142	.32	7,152	.36	2,000,000	.70	12,300,000	.78
$2001-$3000	1,092	.30	6,514	.33	2,900,000	1.02	17,200,000	1.09
$3001 and over	229	.06	1,569	.08	1,000,000	.35	6,450,000	.41
Total	360,159	100.00	1,995,625	100.00	$285,200,000	100.00	$1,576,600,000	100.00
Miscellaneous	77	.....	840					
Total	360,236	.....	1,996,465					

* All calculations are based on delivered price at Factory of the five-passenger, four door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes. No comparative data with a year ago are available due to the change in the listing of the prices from the old F.O.B. which did not include certain standard equipment, to the new delivered prices which include standard equipment, Federal taxes but no transportation charges.

† Percentage for five months was 34.06.

Rogers ICC Member

Senate Confirms Choice of Carrier Bureau Head

The Senate on Aug. 17 confirmed the nomination of John L. Rogers, former director of the Bureau of Motor Carriers, as a member of the Interstate Commerce Commission after delaying favorable action for more than two weeks because of opposition from Senator McKellar, of Tennessee.

Despite McKellar's opposition, Rogers' qualification to serve on the commission was conceded on all sides. An ICC employe for 20 years, Rogers is widely versed in all phases of the commission's activities.

He was named director of the Bureau of Motor Carriers largely as a result of a study he made of motor carriers over a period of years, particularly while he was with the Federal Coordinator of Transportation, before the Motor Carrier law was enacted. He also figured in the ICC six-hour investigation, refrigeration charges and locomotive equipment studies.

Born in Knoxville in 1889, Rogers' career started in the mechanical department of the Southern Railway. He later attended the University of Tennessee and George Washington University and after receiving a mechanical engineering degree he started with the ICC in 1917 as a mechanical engineer in the Bureau of Locomotive Inspection. He received his law degree from National Law School in Washington and was admitted to the bar. In 1925 he was named special examiner in the ICC Bureau of Service and was promoted in 1933 to the position of executive assistant to the Federal Coordinator of Transportation.

"CUCARACHA"

is the name given to this midget motorized sweeper in use in Buenos Aires. It is so light that it can be used to sweep sidewalks too. It has 4 speeds and can turn in a circle of 78 in. radius. The brush has 8 speeds.

PAUL L. HILEMAN has been named general manager of the Jadson Motor Products Co., Bell, California, announced L. M. Clegg, senior vice-president of Thompson Products, Inc., Cleveland and Detroit, the parent organization. For the last nine years Mr. Hileman served as Detroit representative for Thompson Products, working with car manufacturers on engineering and production problems. He is a member of the Detroit Governing Board of the Society of Automotive Engineers.

H. G. HENLY, chairman of the board of Henly's, Ltd., automobile distributors of London, England, and R. A. Hutchinson, vice-president of the Studebaker Export corporation, who is permanently located in Brussells, Belgium, have been visiting at the Studebaker plant in South Bend.

L. M. HART, Montreal, has been elected president of The White Company, Ltd. He succeeds Robert F. Black, who continues as chairman of the board and is also president of the White Motor Company of Cleveland, Ohio. Mr. Hart's election was in recognition of his 24-year record with the company in Canada. As vice-president he has been the managing director of the White organization throughout the Dominion for several years. He was personally responsible for the establishment of a Canadian White factory at Montreal.

RALPH HARRINGTON has been named advertising manager of the General Tire and Rubber Company, it was announced by L. A. McQueen, General Tire sales manager.

FRED A. VOELKER has been appointed chief instructor in the new apprentice training school of the Pontiac Motor Division of General Motors. Mr. Voelker, who has had extensive practical as well as theoretical training in vocational work, expects to start the first students on their apprentice work in early fall and is still receiving applications from boys 17 to 19 years old who want to be considered for this four-year course.

J. A. FIX, plant manager of the South Bend Division of Oliver Far Equipment Co., since 1933, has been made general plant manager of all Oliver branches. He is succeeded at South Bend by Stanley F. Krzeszewski.

ASME Meeting Large

Oil and Gas Power Session Hears Reports, Papers

Attendance records toppled when over 225 persons came from as far away as Austin, Texas, to participate in the four-day oil and gas power session of The American Society of Mechanical Engineers held at the Nittany Lion Inn, State College, Pa. The tenth national meeting of this group began Aug. 19 and was held under the joint auspices of the Oil and Gas Power Division of the ASME, the central Pennsylvania section of that society, and the School of Engineering of the Pennsylvania State College.

The program for the first day was initiated by R. L. Sackett, Dean of Engineering, Pennsylvania State College, who welcomed those present. Dean Sackett's brief address was followed by a series of progress reports given by The American Locomotive Co., Atlas-Imperial Diesel Engine Co., The Buda Co., Caterpillar Tractor Co., Davenport-Besler Corp., Delavergne Engine Co., General Motors Corp., Ingersoll-Rand Co., Nordberg Mfg. Co., Hercules Motors Corp., The United States Coast Guard, and The Pennsylvania Grade Crude Oil Association. E. C. Magdeburger, Bureau of Engineering, U. S. Navy Department, delivered an excellent paper entitled "U. S. Navy Participation in Diesel Engine Development."

Ten technical papers were presented during the entire session and included: "Lubrication Problems in Connection with High-Speed Diesel Engines," by C. G. A. Rosen, Caterpillar Tractor Co., "Correlation of Laboratory Tests on Fuel Oils with Field Operation," by W. F. Joachim, U. S. Naval Experiment Station: "1936 Oil Engine Power Cost Report," by H. C. Major, chairman, Oil Engine Power Cost Sub-Committee; "Sewerage Gas Engines," by W. B. Walraven, Springfield, Ill.; "Waste Heat Recovery from Diesel Engines," by G. C. Boyer, Burns G. McDonnell Engineering Co., "Penn State Method of Testing Diesel Fuels," by J. S. Chandler; "Oil Flow Through Fuel Nozzles," by Prof. K. J. DeJuhasz and "A Study of Diesel Fuels," by W. H. Hubner, and Gustav Egloff, both of Universal Oil Products Co.

Abstracts of some of these papers will be published in subsequent issues of AUTOMOTIVE INDUSTRIES.

Bender Tandem Springs

A. W. Shields, general sales manager of the trailer division of The Bender Body Company, announced that Bender engineers have developed and designed a new style of tandem spring and wheel suspension. This style of suspension permits the use of regular 42 in. Bender springs. It brings the front and rear wheels closer together. By staggering the spring arrangement—extending the front springs back 12 in. and to the inner side of the rear springs—it is possible to place the two axles 12 in. closer together. This brings the outside tire surfaces of the front and rear wheels only 3 in. apart, thereby eliminating independent flexing strains on each set of wheels and springs.

By developing a staggering tandem spring arrangement for trailers that permits the close mounting of wheels The Bender Body Company engineers say they have greatly reduced the pull on the towing car. By actual test it was proven that approximately 93 per cent of a trailer load is carried on the dual axles and only 7 per cent on the draw bar. Tested with a four ton load the weight on the draw bar is only 560 lb. and equal to the weight of three passengers in the rear seat.

Announces New Muffler

Announcement of a new type automobile muffler is made by Albert P. Crell, president, Michigan Bumper Corp.

In describing the new product Mr. Crell stated "The most remarkable advancement in muffler design is the elimination of separate coffles which are now automatically grooved in place, overcoming the necessary evil previously adopted. The shells are seam welded continuously by means of a newly developed process assuring maximum strength against exhaust explosions in the new muffler."

Business in Brief

Written by the Guaranty Trust Co., New York

General business activity declined moderately last week. The weekly index compiled by the "Journal of Commerce" stood at 100.0, as compared with 101.7 the week before and 91.8 a year ago. August promotional sales had the effect of stimulating retail trade, which showed an estimated increase last week from 1 to 3 per cent above that in the preceding week and from 6 to 18 per cent above that in the corresponding period last year. Several branches of trade are anticipating increased business as a result of the bumper crops of grain and cotton.

Railway freight loadings during the week ended August 7 amounted to 769,706 cars, which marks a decline of 12,954 cars below those in the preceding week, a rise of 41,335 cars above those a year ago, and an increase of 187,629 cars above those two years ago.

Food Costs High

Retail food costs during the thirty days ended July 13, according to the Department of Labor, declined 0.4 per cent. The index on that date stood at 85.9, based on the 1923-25 average as 100. This figure represents an increase of 2.2 per cent above that for a year earlier but a decrease of 19.4 per cent below levels prevailing in July, 1929.

According to the Board of Governors of the Federal Reserve System, department store sales during the first seven months of this year were 10 per cent above those in the corresponding period in 1936. The adjusted index for July stood at 94.0, based on the 1923-25 average as 100, as compared with 93.0 the month before and 91.0 a year ago.

Power Output Up

Production of electricity by the electric light and power industry in the United States during the week ended August 7 was 8.8 per cent above that in the corresponding period last year.

Professor Fisher's index of wholesale commodity prices for the week ended August 14 stood at 91.9, as compared with 91.8 the week before and 92.3 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended August 11 showed an increase of $2,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged. Money in circulation increased $14,000,000, and the monetary gold stock rose $35,000,000.

Hupp Owners Favored

Present Hupmobile owners will get delivery of new 1938 cars on a preferred delivery order plan, it was announced by W. A. MacDonald, vice-president and director of sales of Hupp Motor Car Corp. Manufacture of 1938 Hupmobile sixes and eights already has begun at the Detroit plant where shipments of parts and bodies are being received. The new cars are scheduled to come off the factory lines the latter part of this month and formal announcement of the new line will be made early in September.

Contracts for all materials for 1938 Hupmobiles have been awarded, according to an announcement today by Tom Bradley, president of Hupp Motor Car Corp. In addition to a list of suppliers already announced, Bradley named Hayes Body Corporation, Grand Rapids, Michigan, to furnish all bodies; Electric Auto Lite Company, Toledo, Ohio, supplying electrical equipment; Jamestown Metal Equipment Company, Jamestown, N. Y., radiators; Atlas Drop Forge Company, Lansing, Michigan, crankshaft forgings, Stewart-Warner Corporation, Chicago, speedometers and dash instruments.

GM Denies FTC Charge

(Continued from page 238)

he has been consistently unable to sell certain parts, equipment and accessories to GM dealers, and he has been told by many of these dealers that they were unable to purchase certain items because their contracts with GM required the use of its products or those made by specified manufacturers.

Mr. Hart said that while formerly he sold 5000 to 7000 car heaters a year, this item no longer is a major factor in his business because GM and some other manufacturers of automobiles require the installation of their heaters, regardless of the fact that they are of identical manufacture but trademarked with the makers' names instead of the automobile manufacturers' names. Mr. Hart further testified that he recalled an instance where a dealer in GM cars in Oshkosh was obliged to purchase certain garage service equipment at the request of the corporation, although he was in a position to furnish comparable units. Mr. Hart also mentioned anti-freeze solutions and storage batteries on which he was unable to compete for the business of GM dealers.

At the hearing conducted by the commission in Milwaukee, Aug. 9, 10 and 11, H. R. Ritter, head of the Ritter Automobile Co., Madison, Wis., formerly holding a Buick dealer contract, testified that the corporation strongly encouraged purchases by its dealers of supplies, parts and equipment that it manufactured, and occasionally sent unordered surpluses to dealers. He said that from 1932 to 1934, when his firm was Buick dealer, the corporation wanted him to handle its own makes of supplies when he was able to purchase some similar items cheaper from Wisconsin firms of a dependable character. Mr. Ritter told of having "dumped" on him one consignment of anti-freeze solution which he did not want because he considered it inferior to some other brands. When he protested this action, there was no further dumping, he testified.

H. M. Zemlin, a salesman for the Milwaukee Auto Supply & Equipment Co., testified that stockroom clerks at several GM dealers told him "I'd like to buy from you, but it's my job and I can't," and "Sorry, I'm under orders to buy only GM brands." This testimony drew from Mr. Levert the observation that it reported only conversations with clerks, and not executives.

Other similar testimony was given by F. P. Rudy, Kenosha, Wis.; Paul J. Nievel, Oshkosh, Wis.; J. A. Marquardt, Madison, Wis., Isadore Rubin of Milwaukee.

A three-day hearing is scheduled for New York City Sept. 1-3.

Stutz Plan Is Offered

Would Liquidate; New Pak-Age Unit May Be Formed

The creditors' organization of the Stutz Motor Car Corp. of America proposed a plan for liquidation of the company's assets in the Federal district court at Indianapolis, Aug. 14. Long-term liquidation would be accomplished through a management committee with full authority to sell, lease or otherwise dispose of the company's assets for the benefit of the creditors.

The Stutz reorganization has been in Federal court here several months following application to alter the company's position so that it could continue to operate and still protect the interests of the creditors under section 77B of the Federal bankruptcy act.

As proposed, the plan calls for the appointment of Homer H. Davidson, manager of the Automotive Credit Service, Inc., Detroit; A. B. Cronk, trustee of Stutz properties, and Charles S. Thomas, representing the Association of Credit Men's Service, Inc., as members of the management committee. The creditors' committee included these three and W. B. Chase, president of the Shatterproof Glass Co., Detroit.

Credit certificates will be issued bear-

(Turn to page 263, please)

. . . slants

DIAMOND DRILLING—*Hundreds of diamond drilled bores have been made by engineers, preparing the way for the new New York-Queens vehicular tunnel, to determine what kind of material the tubes would have to go through. Wash drilling was used until rock was met and then the diamond drills were employed and sunk at least ten feet further to secure core samples.*

THIS OUGHT TO HELP — *Department of Commerce reports the following new development in use in England as an aid to the sale of used cars. The plan envisages having the car examined by a consulting motor engineer appointed by Lloyd's. It is claimed that an organization has been completed covering the major urban centers. If the car is passed the dealer is given a*

certificate which entitles him to insure the car against mechanical and electrical breakdown and to offer such insurance to his prospective customers. When the car is sold, the dealer sends this certificate to his insurance broker and a policy is then issued to the new owner. It is reported that the policy covers the entire cost of repairing any mechanical or electrical breakdown occurring within six months of the purchase, excluding minor repairs up to 50 shillings ($12.50). The policy not only includes the cost of any new part but the installation charges, and the bill for conveying the car to the nearest repair shop and the passengers to the nearest railway station. .The limit of the liability is the price of the car.

Latest edition of Oakite News Service, that for July-August, includes an **article** on "Hydrophilic Films in Metal Cleaning."*

A new bulletin "HL" has been issued to describe the Niagara Machine & Tool Works' **power squaring shears** designated by the same letters.*

First issue of a new publication, "Pontiac Salesmen's Guild Quarterly," has appeared.*

Allis-Chalmers Mfg. Co. has issued a new bulletin, No. 1832, on **perforated metals.** It is illustrated and contains use tables.*

A new **regional highway** map of the eastern United States and Canada has just been published by the Socony-Vacuum Oil Co. Intended for distribution through the company's touring service, the new map is printed on two sides, showing in one section the northern part of the United States and southern Canada, and in another section the southeastern part of the country as far west as the Mississippi River.

Continental-Diamond Fibre Co. has issued a new **technical bulletin** covering "Celoron" molded plastic couplings.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Company Earnings

B. F. Goodrich Co. reported net income for the first half of the year, available for dividends, of $3,510,697 after all charges and a special inventory reserve of $500,000, equal after preferred dividend provisions to $1.90 per share on the common stock. The net income set a new record. Net income for the like portion of last year was $2,727,606. Capitalization has been altered in the year. Sales for the period were $78,566,619, a gain of 19 per cent over sales of $65,994,521 for the 1936 half year.

Auburn Automobile Co. reported a net loss for the quarter ended May 31 of $322,584 against $145,724 for the like period of last year. For six months the net loss was $715,168 against $849,228 for the like portion of the preceding fiscal year.

Caterpillar Tractor Co. reported for seven months net income of $7,407,088 against $5,349,150 in the like period of 1936. Sales were $44,352,388 against $32,803,644.

Automotive Metal Markets

Steel Mills Wait Anxiously for Large Tonnage Orders Against 1938 Car Production; Price Structure Firm

Activity in the metal markets runs parallel to the pace of automotive plant operations during the preparatory change-over period. Steel rolling and finishing mills have sufficient orders on their books to enable most of them to operate at a rate which, for midsummer, is decidedly reassuring. Mills in the Michigan area have stepped up their activities in keeping with the resumption of work by parts and assembly plants, following vacation shutdowns.

Some of the steel producers have much more adequate backlogs than others, and there is a certain amount of apprehension among Mahoning valley and Pittsburgh district flat rolled steel producers that they will have little unfilled tonnage left on their books at the turn of the month. Certain it is that the chief source of worry of steel producers up to a week or two ago, that of being able to make deliveries on time, is now shifting here and there to blank spaces on order books. While a moderate amount of body and fender stock for initial assemblies of 1938 models has been ordered, all eyes in the steel market are on the appearance of real tonnage commitments.

Market conditions being what they are, nervousness over when a real buying movement will develop is not expected to have any influence on prices, as has so frequently been the case in the past. With automobile prices definitely slated for higher ground, steel sellers feel that prevailing levels are safely entrenched. Competition in other forms, however, is certain to become more and more keen as the time nears when worth while tonnage business is expected to come out.

A release by Copper Institute, Inc., revealing an increase of 6,700 tons in total refined stocks and a drop of deliveries into consumption from 77,700 tons in June to 67,300 tons in July caused a mild reaction in the coper market's trend. The dip in deliveries into consumption denotes a 33 1/3 per cent decline from the year's high of 95,900 tons in April. This statistical disclosure wiped out most of the premium paid in foreign markets over the domestic price of 14 cents. The export quotation at the beginning of the week was only 14.15 cents. Composition ingot prices and refiners' scrap bids were reduced ¼@½ a cent per pound. Producers took a middle-of-the-road attitude, holding that the domestic price of 14 cents was neither too high, as some market analysts believe, nor too low, as some speculative elements think.

Entirely unconfirmed rumors of a drouth in the tin-producing section of the Federated Malay States continue to furnish the main gossip in the tin market. The large producers, who operate relatively powerful dredges, are thought to have been little affected, so that even if those who mine tin ore in a more primitive way cannot produce their full quotas due to lack of water, the gap can be filled easily by the more highly mechanized mining properties. The prevalent talk of drouth could not overcome the market's lethargy, due to lack of consumer buying, and spot Straits tin was offered at the beginning of the week at 59½ cents, ½ a cent down from the preceding week's close. The price was fractionally higher on Tuesday, but the tone of the market was little changed.

Pig Iron—Producers announced on Tuesday that fourth quarter prices would remain unchanged from those of the third quarter.

Lead—Demand has turned light. Market steady.

Zinc—An advance of $2 per ton in ore prices imparted a strong undertone to the market for slab zinc.

—W. C. H.

Third Quarter Output

(Continued from page 235)

the next highest first ten days of August, which was in 1928, by 1536 cars. Although deliveries probably will fall off somewhat the last part of the month, the company estimates that 20,000 new cars will go into the hands of owners by Sept. 1, which will compare with 12,274 a year ago.

The Buick division of General Motors is currently shipping the last of the 220,353 model 1937 cars produced. The gain for the model year over 1936 model output was 51,757 units or 30 per cent. The shut down for model changes will be only ten days, a record for brevity, and 1938 series production is expected to begin Aug. 23. The company has a backlog of 6000 orders for immediate delivery. These will be filled with 1938 cars. W. F. Hufstader, general sales manager, said he thought production would have topped the original schedule of 240,000 cars had it not been for the strike last spring. Production will be increased on series 40s for next season. Buick sales for the first ten days of August were 5898 cars against 3654 a year ago. July retail sales topped those for June the first time.

Oldsmobile retail sales during the first 10 days of August this year were 63 per cent above the same period last year, and greater than in any other similar period in the company's history, it was reported today by D. E. Ralston, Oldsmobile general sales manager. During the recent period a total of 6836 Oldsmobile sixes and eights were sold to top the 4195 units sold during the first 10 days of August in 1936. From January 1, 1937, to August 10, a total of 136,558 Oldsmobiles have been delivered to retail purchasers, a substantial gain over the same period in 1936.

While admitting "there was some talk on the subject," Paul G. Hoffman, president of Studebaker Corporation, South Bend, Ind., branded as false rumors to the effect that Studebaker would use bodies from the Auburn plant, following other rumors that the Cord Corporation would discontinue the manufacture of Auburn automobiles.

Chrysler Buys Plant

Chrysler Corp. has purchased the old Graham-Paige plant at West Fort and Clark streets in Detroit for $275,000. Chrysler has been using the plant for some time for storage purposes and expects to continue its use for this purpose.

Italian Power Boats Coming

Count Theo Rossi di Montelera, first European challenger for the American Gold Cup, arrived here on the Conte di Savoia with two boats and a retinue of mechanics bound for Detroit and the thirty-fourth renewal of the event there Labor Day.

Rossi, who represented Italy in the Florida international races over here in 1934, also is accompanied by Gudio Cattaneo, a fellow countryman and holder of the European 12-litre (734 cu. in.) mark of 85.81 miles an hour. Cattaneo will drive one of the Rossi boats which he helped to design.

Powered with 12-litre Isotta Fraschini supercharged motors, both of the Rossi boats, "Aradam" and "Alagi" are newly built but they are not unlike Cattaneo's world record holder in design. The frames are of metal and the thin wood planking is covered with canvas treated with a special paint. They each have a single cockpit and are steered by two rudders, one forward and one aft.

Ethyl Gasoline Use Up Abroad

Foreign consumption of leaded motor fuel is rising according to a report made public by J. Coard Taylor, vice-president of the Ethyl Gasoline Corporation. The 1937 trend is sharply upward both in Europe and the British Empire.

In Italy there was a gain of 100 per cent in the use of Ethyl gasoline during the first four months of the year. In Great Britain and Ireland the Ethyl distribution in the same period increased 31.8 per cent, while the total increase of all gasolines distributed by the Ethyl licensees in this area was 19.3 per cent.

In Australia, figures for the first five months disclose a rise of 71.9 per cent in Ethyl and of 27.0 per cent in leaded regular gasoline. In Canada, Ethyl sales rose 55.2, while the percentage advance in all gasolines sold by the licensees was 22.8.

In Alaska, the Canal Zone, Hawaii, and the Philippines there was an increase of 39.4 per cent in the use of Ethyl, contrasting with a 2.4 per cent increase in all gasolines sold by licensees.

Burd Gets Chrysler Order

The Burd Piston Ring Co., of this city, has been awarded a contract by Chrysler for automobile heaters valued at from $350,000 to $400,000, the final volume depending on Chrysler sales during the fall season. The Burd concern announces that its total automobile heater sales during 1936 totaled $1,271,647.

Michigan Sales Tax Ruling

The State of Michigan's board of tax administration has rescinded an earlier ruling on the sales tax as it applies to automobiles. Amount of the trade-in may not now be deducted from the purchase price of the new car bought. Another Michigan ruling prohibits deductions on repossessed automobiles. Such automobiles had been classed as returned goods.

Miller-Tydings Bill Signed

President Roosevelt has signed the Miller-Tydings Price Maintenance Bill which was attached as a rider to the District of Columbia Tax Bill. The Miller-Tydings bill permits manufacturers to contract for minimum resale prices. It effectuates similar bills on the statute books of 42 states. It was designed to end "loss-leader" selling by stores. The President disapproved of the bill but signed it to get the District of Columbia's tax bill through.

Buick Advertising To Rise

Buick will have an increased advertising appropriation for the 1938 model year in view of an anticipated increase in retail volume, according to T. H. Corpe, director of advertising and sales promotion. Magazine schedules will be comparable to the current year, he said, while there will be an increase in newspaper lineage. In addition a greater number of newspapers will be used, due to a gain of more than 200 in Buick dealer representation. Much of this gain is represented in smaller cities, Corpe said.

Proven media will be used in accordance with the customery Buick advertising policy, and will include national magazines, trade publications, newspapers, outdoor postings and sports broadcasts, the latter being confined to major ring events.

Cadillac-LaSalle Heater

A new type of automobile heater that utilizes the previously wasted center area of the radiator and is said to increase efficiency is announced for fall by Cadillac-LaSalle. The unit combines the passenger compartment heater with the windshield defroster, but a more compact fan design developing two way circulation through the heater core is used. In operation, a six-bladed, ring-mounted fan blows air through the heater core while at the same time a turbine fan sucks in air at the center of the ring. This latter air is in turn forced into the defroster. Tests are said to show circulation and the amount of heat have been improved more than 35 per cent without any change in the size of the heater.

Pontiac Dealer Net Up

Pontiac dealers national'y realized a net profit in the first six months this year $2,500,000 greater than in the comparable period in 1936, or about $10,300,000 on the basis of a 32 per cent gain, points out H. J. Klingler, general manager.

Calendar of Coming Events

SHOWS

Poland, Automobile Salon (Foire Orientale), Lwow ..... Sept. 1-15
Yugoslavia, Automobile Section, Autumn Fair, Ljubljana ..... Sept. 1-12
Yugoslavia, Automobile Section, Commercial Fair, Belgrade..... Sept. 11-21
France, 31st International Automobile Salon, Paris ..... Oct. 7-17
Great Britain, 31st International Automobile Exposition, London... Oct. 14-23
Czechoslovakian Automobile Show, Prague ..... Oct. 16-24
National Automobile Show, New York, Oct. 27-Nov. 3
Toledo, O., Automobile Show. Oct. 27-Nov. 3
Italy, 10th International Automobile Salon, Milan ..... Oct. 28-Nov. 8
Boston, Mass., Automobile Show, Oct. 30-Nov. 6
Los Angeles, Cal., Automobile Show, Oct. 30-Nov. 7
San Francisco, Automobile Show, Oct. 30-Nov. 7
Cincinnati Automobile Show. Oct. 31-Nov. 6
Great Britain, 13th International Commercial Automobile Exposition (trucks and buses), London... Nov. 4-13
Chicago Automobile Show ..... Nov. 6-13
Akron Automobile Show ..... Nov. 6-12
Omaha Automobile Show..... Nov. 6-11
Brooklyn Automobile Show..... Nov. 6-13
Columbus Automobile Show ..... Nov. 6-12
Detroit Automobile Show..... Nov. 6-13
Motor Truck Show, 4th Annual, Newark, N. J. ..... Nov. 6-12
Newark, N. J., Truck Show..... Nov. 6-12
Buffalo, N. Y., Automobile Show.. Nov. 6-13
Indianapolis, Automobile Show.... Nov. 6-13
Newark N. J., Automobile Show.. Nov. 6-13
Philadelphia Automobile Show.... Nov. 6-13
Pittsburgh, Pa., Automobile Show. Nov. 6-13

SHOW BUSINESS

Manager of the National Automobile Show in New York is Alfred Reeves, 366 Madison Ave., N. Y. C. Inquiries concerning all matters connected with the national show should be addressed to him. AUTOMOTIVE INDUSTRIES will be pleased to furnish names and addresses of local show managers on request.

Toronto, Ont., Automobile Show.. Nov. 6-13
Great Britain, 36th Scottish International Automobile Exposition, Glasgow ..... Nov. 12-20
Baltimore, Md., Automobile Show, Nov. 13-20
Cleveland, Ohio, Automobile Show, Nov. 13-20
Jersey City, N. J., Automobile Show, Nov. 15-20
Milwaukee, Wis., Automobile Show, Nov. 17-24
Springfield, Mass., Automobile Show, Nov. 14-20
St. Louis, Mo., Automobile Show. Nov. 14-21
Portland, Ore., Automobile Show. Nov. 14-21
Denver, Colo., Automobile Show, Nov. 15-20
Montreal, Que., Automobile Show, Nov. 20-27
Kansas City, Mo., Automobile Show, Nov. 27-Dec. 4
A.S.I. Show, Navy Pier, Chicago, Dec. 6-Dec. 11

CONTESTS

National Outboard Championship Regattas, Richmond, Va. ..... Sept. 18-19

CONVENTIONS AND MEETINGS

U.A.W. Annual Convention, Milwaukee, Aug. 23
American Chemical Society, Rochester, N. Y. ..... Sept. 6-10
International Congress on Carbohydrate Carburants, Rome ..... Sept. 10-12
National Trailer Show, New York, Sept. 10-15
S.A.E. Section Regional Tractor Meeting, Akron, Ohio..... Sept. 15-17
American Transit Association, 56th Annual Convention, White Sulphur Springs, W. Va. ..... Sept. 19-23
S.A.E. Section Regional Transportation Meeting, Chicago ..... Sept. 29-Oct. 1
American Foundrymen's Association Midyear Meeting, Columbus, Ohio, Sept. 30-Oct. 1
S.A.E. Fuels and Lubricants Regional Meeting, Tulsa, Okla. .... Sept. 30-Oct. 1
S.A.E. National Aircraft Production Meeting, Los Angeles, Calif.... Oct. 7-9
American Foundrymen's Association, Regional Conference, Rolla, Mo., Oct. 8-9
National Battery Manufacturers Asso., Chicago ..... Oct. 10-12
National Metal Congress, Atlantic City, Oct. 18-22
S.A.E. Annual Dinner, Commodore Hotel, New York ..... Oct. 28
American Petroleum Institute, 18th Annual Meeting, Stevens Hotel, Chicago ..... Nov. 8-12
S.A.E. National Production Meeting, Flint, Mich. ..... Dec. 8-10

Photos by Lionel Green and Ewing Galloway

Automotive Materials

6

From the earlier days of the automobile, when practically no rubber was used excepting for tires anud tubes, its use has steadily increased to the present-day peak of 50 lb. or more per car. New problems constantly are bowing to this most versatile material.

Its limitations have in great part been pushed aside in the laboratory so that, together with its synthetic complement, rubber has become the one big factor in the elimination of noise and body or chassis vibration.

From across the seas and from the laboratory mills come the materials that are fabricated into parts so widely scattered throughout current models.

How these parts are made to fit their jobs, what is being done to broaden this even now wide field, the whole story in fact of rubber, both natural and synthetic, will be found in this, the sixth article in the Automotive Materials Series.

On the rubber-to-metal production lines at U. S. Rubber Products. Spraying metal stampings with cement to provide good adhesion

RUBBER...

Rubber Parts in 1937 Passenger Cars

The following representative lists of parts made of rubber (excluding tires) on this year's passenger cars have been compiled from data supplied by four manufacturers Buick, Dodge, Graham and Oldsmobile.

Buick

121 rubber parts, weighing 33.72 lb. are incorporated into the chassis. Weights of rubber parts in the body, Buick series 40 or 60, total 28 lb.
Accelerator pedal assembly
Bumper assembly
Bumpers—hood top panel, rear axle
Ferrule
Floor mat retainer
Gear shift dust cap
Grommets — bumper pad, gas tank filler, bumpers, pedals
Hoses—radiator
Insulators—tail pipe hangar
Pads—engine support, spring insulator, lamp, pedal, hood corner, control lever (floor), trans. support
Plate—steering post and pedal
Running board assembly
Seals—gas tank filler neck
Shims—body, body sills
Spacer
Spreader, water pump packing
Steering wheel
Tubing
Washers
Welt

Dodge

Chassis parts made of rubber on the Dodge weigh 24 lb. and number about 142. Weight of body parts is 25 lb.
Arm rest
Belts—fan
Boots—master cylinder, front and rear wheel cylinders
Bumpers—door, glove box door, hood and shell, door glass, frame axle, front spring
Bushings—shock absorber pivot, sway eliminator link and shaft
Button—starter pedal
Covers—fuel tank filler hole, bumper holes
Cups—master cylinder piston, master cylinder secondary, front and rear wheel cylinder piston
Gaskets—trunk lid hinge, ignition coil mtg., cigarette case
Gearshift lever knob
Grommets—dash, chassis wiring, tail pipe support
Hose—water pump, radiator inlet and outlet, fuel tank filler tube, fuel line, fuel tank vent, wheel brake
Ignition cable ring
Insulators—body, body stud
Mats—running boards, floor (front)
Pads—head lamp bracket, tail lamp bracket, pedal, license lamp bracket, clutch and brake, gear shift, hand brake lever
Plugs—clutch housing hole, floor pan
Seals — starter pedal, fender shields, head lamp bracket
Seat—back break (front), tacking
Shims—body bolt
Spark plug cable nipple
Steering wheel
Supports—engine
Tubing—cowl ventilator, windshield wiper, radiator outlet
Weatherstrip — windshield, windows, doors, cowl ventilator, trunk lid
Wind cord
Vibration damper

Oldsmobile

Total number of rubber parts approximate 142.
Anti-squeak—head lamp to hood, front fender
Bearing retainer
Belt—fan
Boot—accelerator pedal
Bumpers—rear spring, tire cover, rear spring, upper arm support knuckle
Gaskets—license plate lamp, side tail lamp, fender well
Hose — radiator drain, windshield wiper, radiator
Insulator—floor pan to front
Mountings—engine
Grommets—bumper, upper and lower dash, fuel tank filler, steering post, spark plug wire, horn wire
Pads—rear spring insulator, starting pedal, pedal shank, rear fender step, clutch and brake pedal
Plates—accelerator pedal, floor pedal
Plugs—fender well, wiring grommet
Running board
Seals—clutch and brake pedal, body to frame, water pump bypass, water pump
Shift lever dust cap and knob
Steering wheel
Washer—dimmer switch seal

Graham-Paige

Body and chassis rubber parts number approximately 210 and weigh 64 lb.
Anti-squeak—roof frame
Belts—water pump, fan
Boots—wheel cylinder, master cylinder
Bumpers—axles, cowl for hood rest, hood corners, hood doors
Bushings—springs, kick shackle, shock absorber, sway control link
Cover—spare wheel
Cups—master cylinder piston, master cylinder and valve, wheel cylinder
Damper—bushing for super charger drive
Gaskets—super charger to manifold flange, cowl top vent
Grommets—tail lamp, headlamp bracket, bumpers, rear link, support rod, filler tube, steering post, dash for wiring harness, hand brake cable in dash, overdrive, cable in dash
Headlamp harness
Hose—water pump to radiator, vent tube to gas tank, oil bath air cleaner, super charger to manifold, brake, accel. pedal
Mats—front floor, trunk floor, running board
Pads—pedals, starting motor, front carpet
Shims—body, rear floor pan
Spacers—body bolts
Stops—door checks
Strip—windshield division molding, rear window, glass to center molding filler
Supports—engine, muffler
Tubing—cowl vent. drain
Washers—clutch shaft lever, master cylinder inlet valve
Weatherstrip—trunk lid, doors, windshield glass

Firestone has new line for preparation and curing of bonded rubber-to-metal parts such as motor mounts, bumpers, bushings, etc. It represents the very latest type of layout, conveyorization, and equipment

is an increasingly important material in the makeup of the modern automobile. Here is the HOW, WHY and WHERE of its application and the use of its synthesized substitutes.

By Joseph Geschelin

"Automobile Facts and Figures—1937" (published by the Automobile Manufacturers Association) is the authority for the statement that the automotive industry ranks first as a consumer of rubber. Actually, 80 per cent of all rubber produced in the United States finds its way into passenger cars, trucks, buses, tractors, and other equipment that is characteristically automotive.

There is nothing of the commonplace about these facts when you stop to consider the widespread use of mechancial rubber goods in every walk of life in all manner of industry.

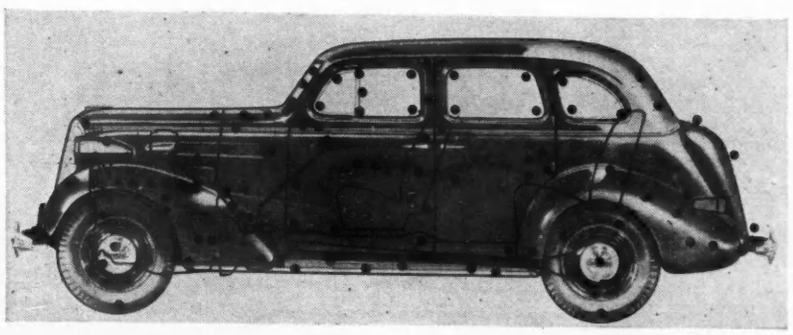
According to a recent report of the Rubber Manufacturers Association (AP news dispatch, July 10, 1937) about 60 per cent of total rubber sales to the automotive industry comprise tires and tubes. This, however, is a more or less static market rising and falling precisely with unit sales. And it is in the mechanical rubber goods of every description that we find the greatest growth and potentiality of unlimited expansion. This category accounted for 21.4 per cent of total sales volume in the first quarter of this year as compared with 10 per cent in 1934.

Exploring the background of the mechanical rubber goods development, it is obvious that the remarkable expansion of rubber-metal mountings and molded rubber parts of every description may be credited to the research laboratory. From the research laboratory, rubber has emerged as a new structural material many of whose physical characteristics and vibration and sound-absorbing properties still are unexplored. For the automotive designer, rubber offers a fertile field for further development; for the rubber producer, the automobile is a source of unlimited expansion and better profit possibilities than any other phase of business in recent years.

Looking at the record, the representative passenger car of 1937 has from 200 to 300 individual molded rubber parts (excluding tires and tubes) at various places in the body and chassis. When these parts are weighed, the total per car, for some cars, exceeds 50 pounds!

Today—over 50 pounds per car in molded rubber parts. Twenty years ago, most of the rubber was in the tires; 10 years ago, probably only five pounds were represented by parts other than tires.

In a recent national broadcast—on behalf of Chrysler—the irrepressible Major Bowes took Rubber as his subject. According to his statement, in 1936 Chrysler used 50 million pounds (25,000 tons) of rubber just for the molded parts, excluding tires. For a production of about a million cars, this represents about 50 pounds of rubber parts per car, on the average. Dodge



Phantom view 1937 Chevrolet sedan indicating location of some of the 200 odd applications of rubber parts in the body and chassis structure

uses almost precisely 50 pounds per car in filling close to 200 application points.

If this article had been written a few years ago, we could have stated all of the basic automotive applications in a few paragraphs. It's grown far beyond that stage today. However, elsewhere in this article we list many of the commonly-used applications, based upon special reports provided by Dodge, Olds, Buick, Graham-Paige, and others. In addition, there is a brief table listing the many rubber parts produced by the U. S. Rubber Products plant in Detroit.

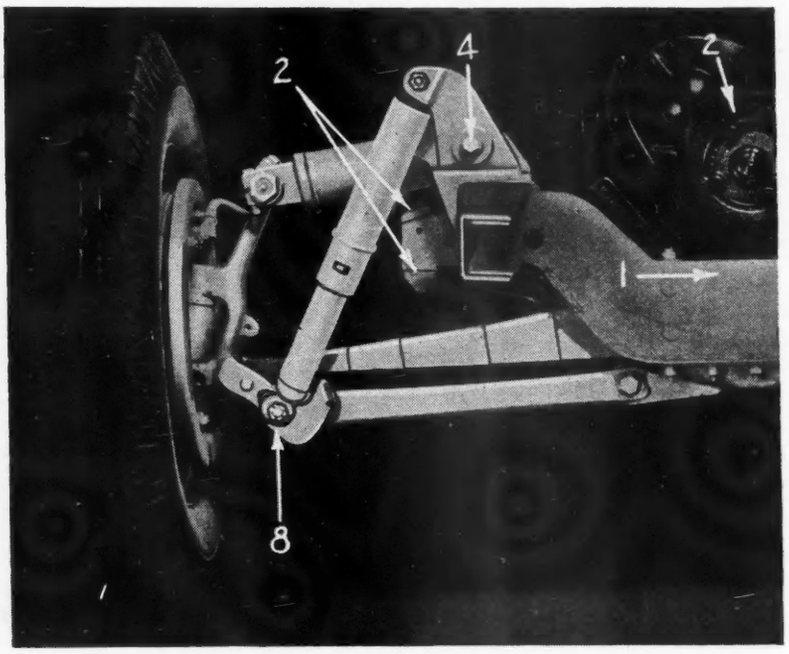
To summarize some of this material, we may note that Buick uses 121 rubber parts in the chassis, weighing 33.72 pounds. The body for the Buick Series 40 and 60 contains 28 pounds of rubber parts—a total of around 62 pounds per car. Dodge has close to 200 rubber parts in chassis and body, weighing 49 pounds. Graham-Paige has about 65 pounds of rubber parts. Chevrolet has well over 200 rubber parts in its 1937 car.

Applications

Analysis shows that rubber is being used in an endless variety of ways. First there is hard rubber vulcanized into the familiar forms of steering wheels and battery cases. Then there are the elastic rubber parts used for grommets, window seals, windlace, windshield seals, etc. Another type of vulcanized rubber product is found in floor mats, running board mats, and rubberized fabric coverings. But perhaps the most extensive use is in the structural form of the rubber-to-metal molded parts such as are devised for

(Right) Plymouth, Dodge and De-Soto use this gas tank filler neck hose made of Thiokol, a molded synthetic rubber-replacing material

(Below) Generous use of rubber is a feature of the Studebaker Planar independently sprung front axle. Applications comprise—a front motor mount, two bumpers at each end, two pieces in the vibration dampener, four bushings at the upper end of the shock absorber, and eight bushings at the lower end



Sources of Automotive Rubber Products Are Widespread

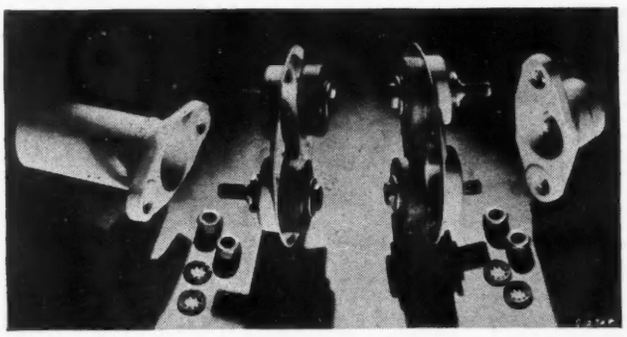
Acme Mfg. & Gasket Co., Philadelphia, Pa.
American Hard Rubber Co., New York
Baldwin Rubber Co., Pontiac, Mich.
Belflex Corp., Toledo, Ohio
Bowling Green Rubber Co., Toledo, Ohio
Brown Rubber Co., Lafayette, Ind.
Champion Anti-Rattler Co., St. Louis, Mo.
Cincinnati Rubber Mfg. Co., Cincinnati
Corduroy Rubber Co., Grand Rapids. Mich.
Davis, Kraus & Miller, E. Detroit, Mich.
Diamond Mechanical Goods Div. of B. F. Goodrich Co., Akron
du Pont de Nemours & Co., E. I., Fairfield, Conn.
Durkee-Atwood Co., Minneapolis, Minn.
Faultless Rubber Co., Ashland, Ohio
Featheredge Rubber Co., Chicago
G. M. Co. Mfg. Co., Long Island City, L. I.
Goodrich Co., B. F., Akron, Ohio
Goodyear Tire & Rubber Co., Akron, Ohio
Industrial Rubber Goods Co., St. Joseph, Mich.
Inland Mfg. Co., Dayton, Ohio
Karpex Mfg. Co., Indianapolis, Ind.
Kreger Mfg. Co., Chicago
Kuehn Co., Milwaukee, Wis.
Lee Tire & Rubber Co., Conshohocken, Pa.
Loock & Co., R. J., Baltimore, Md.
Lord Mfg. Co., Erie, Pa.
Luzerne Rubber Co., Trenton, N. J.
Miller Rubber Products Co., Akron, Ohio
P. O. B. Mfg. Co., Cincinnati, Ohio
Powell Muffler Co., Utica, N. Y.
Premier Rubber Mfg. Co., Dayton, Ohio
Republic Rubber Co., Youngstown, Ohio
Rubbercraft Corp. of Calif., Ltd., Los Angeles, Calif.
Self-Vulcanizing Rubber Co., Chicago
Snyder & Son, M. L., Philadelphia, Pa.
Sponge Rubber Products Co., Derby, Conn.
United States Rubber Co., New York
United States Rubber Products, Inc., New York
Van Cleef Bros., Chicago

Assembling uncured rubber pieces in metal forms preparatory to molding. This is a view on the U. S. Rubber Products motor mounting line

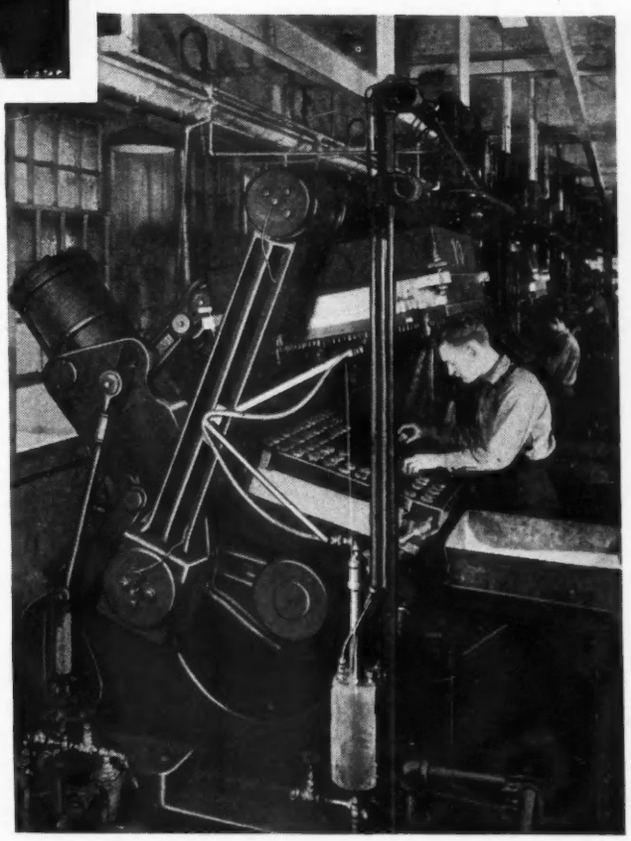
for producing resilient seat cushions for buses, aircraft, trucks, railcars, etc. And an offshoot of this is the use of sponge rubber for arm rests and for safety seat back rolls that appeared

With the growth of rubber in the automobile have come many special problems involving properties far beyond the capacity of natural rubber. There are places, for example, where the flexibility and strength of rubber must be combined with the ability to resist the action of high temperatures, and of greases, oils and other fluids that cause a rapid deterioration of natural rubber parts.

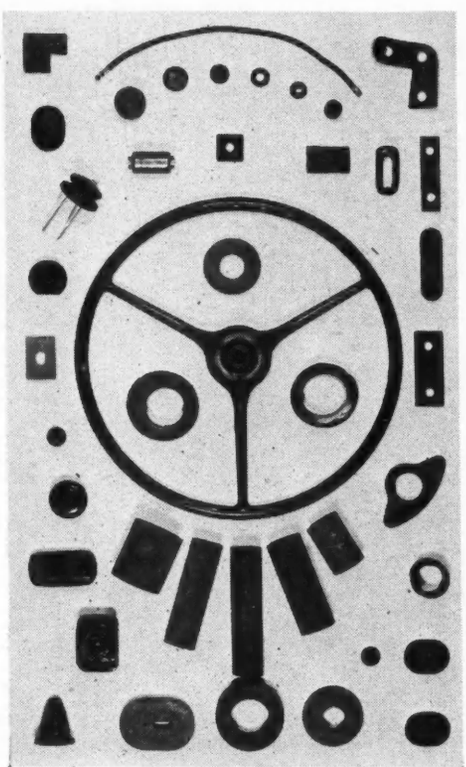
As the natural product of research, several producers anticipated these special problems and only a few years ago made available some laboratory-grown rubber-like materials, possessing many of the desirable qualities of rubber but having also the unique property of resisting the action of forces inimical to nature's product. The most prominent of these synthesized materials are—Neoprene, a DuPont prod-



(Below) One of the largest and most modern toggle-operated molding presses used in the production of rubber parts. This machine is one of a battery of ten recently installed by Firestone at its Akron plant. Steam pressure and temperature, opening of press, and ejection of work after curing, all are automatic



(Above) Disassembled view of Thompson Products rubber insulated universal joint used by Studebaker in 1937.



(Left) Display board showing part of the many rubber parts used in the 1937 Chevrolet

motor mountings, spring bumpers, body and accessory mounting, etc.

The most recent of the technical developments in rubber is the use of sponge rubber and latex whip processes on Chrysler Corp. cars this year. Among the principal producers of rubber cushions and seat backs are Mishawaka Rubber & Woolen Mfg. Co., Dunlap, and Firestone.

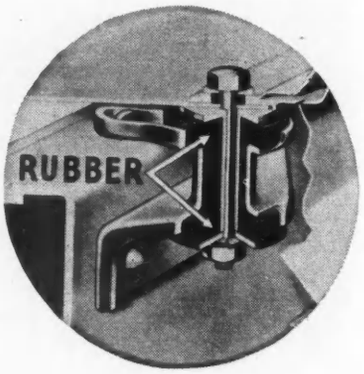
uct; and Thiokol. Man-made rubber seems to be the perfect answer to such problems as—the gasoline line connection for floating power and rubber-suspended engines in general; for hydraulic brake system rubber parts; for gas tank filler connections; gas tank grommets, etc., etc.

Other applications of mechanical rubber, perhaps include—rubber vibration dampeners; universal joints—such as the Thompson Products joint used by Studebaker; the Firestone "air-spring" embodying a large rubber bellows inflated with air; resilient bushings; large rubber brackets for sway-bar suspensions as used by Monroe; etc., etc.

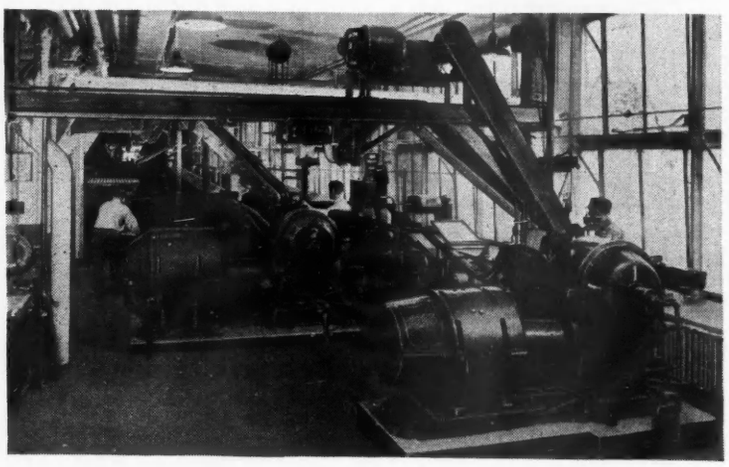
Technology of Rubber Processing

Although the technology of rubber processing is complicated in the extreme and involves many proprietary techniques, there is what may be termed a common practice used in the production of a large proportion of mechanical rubber products. For a brief summary of this, we have drawn in part on a paper entitled, "Rubber Cushioning Devices" by C. F. Hirshfeld, Chief of Research, The Detroit Edison Co., and E. H. Piron, engineer, Transit Research Corp., which was read at the semi-annual meeting of the ASME in Detroit, early this year.

According to the authors, the following may be taken as the common steps in the process—



Rubber-insulated outrigger for body mounting is a feature of all Chrysler Corp. cars. Cross-sectional view shows how the body and body bolts are completely insulated from contact with the frame



Firestone extruding department represents latest type of equipment used for extruded rubber parts production. The "tubing" machines shown here are fed by automatic ribbon feed on conveyors from the plasticating mills. They produce a continuous flow of extruded rubber compound of every wanted section

Automotive Products of U. S. Rubber Products Inc.

Tires and Tubes
Axle Bumpers
Spring Shackles
Body Sill Anti-Squeak
Hood Ledge Covering
Door Bumpers
Windshield Strip
Windshield Wiper Blades
Spark Plug Thimbles
Grommets for Wires and Tubing
Engine Mountings
Gear Shift Ball
Kick Plates on Dust Shield
Running Board Covering
Floor and Toe Board Covering
Hood Corner Protectors
Hood Latch Bumpers
Tubing
Insulated Wire
Steering Wheel
Fan Belt
Head Lamp wire (covered with rubber which will not tarnish silver)
Car Bumpers of Steel with Rubber Insulating Pads
Pedal Pads
Accelerator Button
Horn Button
Distributor Head
Water Hose
Distributor Thimbles
Battery Jars and Case
Door Handles
Radiator Cap
Radiator Shims
Shock Absorber Link Cushions
Vibration Dampners
Hydraulic Brake Parts (Pistons, Boots and Pressure Hose)
Universal Joint parts
Window Channel
Toplight frame
Sealing washers around pedal slots, etc.
Step Pads
Magneto Coupling
Windshield Post Pad
Running Boards with Vulcanized Rubber Coverings
Shaft Coupling
Rubber Molding
Passenger Car Body Mountings
Brake Lining Containing Rubber
Windlace Tubing Around Doors
Fabric and Carpet Containing Rubber
Clutch Hub—Rubberized Fabric
Door Checks
Door Dovetails
Steering Column Bushing
Tire Valve Cap and Core Seals
Hard Rubber Connectors of Electric Wiring
Wind Seal (Rear Windows and Bottom of Doors)
Bumpers on Open Car Top Support Irons
Hood Center Bumper
Gaskets
Sponge Rubber Arm Rests
Sponge Rubber Seat Cushions
Ventilating Window Frames
Coach Marker Lamp Housings
Coach Baggage Rack Bumpers
Gear Shift Lever Dust Cover

(1) WASHING AND DRYING

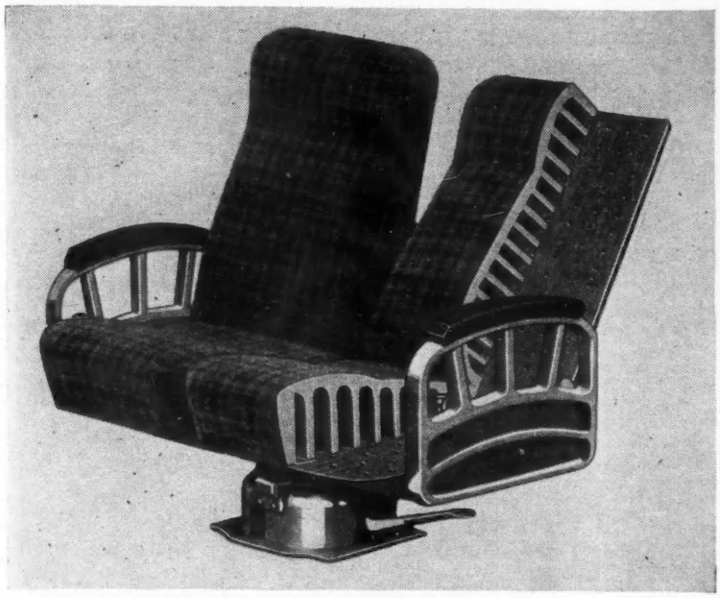
The raw rubber, particularly that obtained from wild plants, contains a certain amount of dirt and foreign matter as well as serum-borne materials trapped during the coagulation. It is customary to wash it with water and then to dry it so as to remove excess moisture.

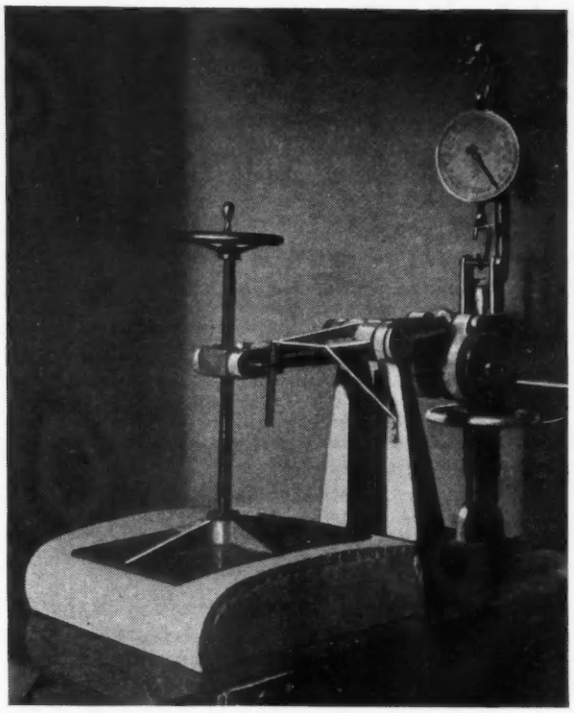
(2) MASTICATION AND COMPOUNDING

The washed material is squeezed, pulled, and torn apart in some sort of mill. This converts it from a fairly tough, rough, and somewhat springy material to a plastic, tacky mass. In this condition it takes up readily the many different materials that must be mixed with it to produce the desired qualities in the final product.

(3) CALENDERING OR SHEETING

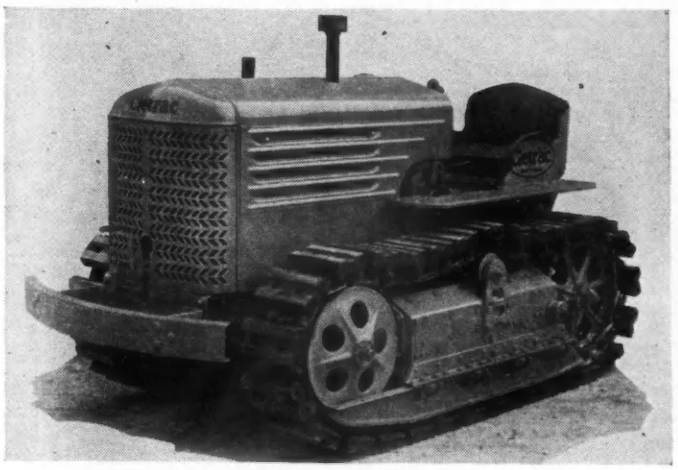
This or some equivalent process is commonly used after compounding. It is done by means of rolls which squeeze and roll the batch into long ribbons or sheets. Variations of this process are offered by certain methods of extru-





(Above) Firestone Latex Whip cushion assembled in a Heywood-Wakefield chair seat. Note perforated seat cushion and back base, with holes registering with the large cored holes in the cushion. The combination has the effect of controlled displacement action by metering air through measured orifices

(Upper right) This is a pressure gage used in testing Mishawaka seat cushions. It determines the softness of a cushion by showing the depth in inches that a measured pressure compresses a given surface area



(Right) For certain applications, Cleveland Tractor equips the track shoes with Firestone molded rubber cleats

sion by means of which long lengths of the desired cross section may be obtained.

(4) VULCANIZATION

For this purpose the rubber is frequently placed in metallic molds which enclose it completely. The molds are then placed in presses or equivalent devices which hold them together with a certain predetermined pressure. While in this position the mold and its contents are carried through a temperature-time treatment which produces the desired degree of vulcanization. There are many variations of this step.

(5) FINISHING

When the vulcanization is complete the articles are removed from the molds or other devices in which they were vulcanized. Flashes resulting from flow into cracks or expansion chambers are removed if necessary.

Coming to the field of man-made rubber products, we find an entirely new picture. Neoprene, a product of the duPont company, is made by polymerizing of a new chemical compound, Chloroprene, converting the volatile liquid into a tough, rubber-like solid said to be superior to rubber in many ways.

The synthesis of Neoprene starts with the formation of calcium carbide from coal and limestone. In turn, calcium carbide is converted to acetylene gas which is polymerized in the presence of a catalyst to form a material known as mono-vinyl-acetylene. Treatment of this material with muriatic acid produces Chloroprene which is immediately polymerized into Neoprene.

When it comes to the actual production of rubber parts, using Neoprene, rubber manufacturers use the same techniques and production equipment as in the case of natural rubber. Different reinforcing materials produce compounds with different properties just as with rubber compositions. Finished articles are formed for vulcanization in exactly the same manner.

One essential difference in the conditions necessary for the vulcanization of Neoprene and rubber is that while sulphur in some form is essential to the proper vulcanization of rubber, it is not needed with Neoprene. Nevertheless, many Neoprene products are compounded with sulphur in order to bring out certain special characteristics.

While Neoprene is more expensive than rubber, its use is justified for many special applications due to the following unique characteristics which, according to duPont, make compounds

containing it superior to rubber compositions:

1. Neoprene compositions resist the deteriorating effect of petroleum hydrocarbons such as gasoline, kerosene, oils and greases far better than rubber products. The same is true of animal and vegetable fats and oils.

2. Neoprene compositions do not deteriorate as rapidly as rubber at elevated temperatures.

3. Neoprene compositions do not check and crack when exposed to direct sunlight to the same extent as rubber compounds.

4. Neoprene compositions are less permeable to gases than rubber compound.

5. Neoprene compositions do not oxidize or age as rapidly as rubber compounds. Ozone does not attack Neoprene as rapidly as rubber.

6. Neoprene compositions resist acids and alkalis to a greater extent than rubber.

7. Cements of Neoprene impregnate porous bodies better than rubber.

Thiokol, a product of the Thiokol Corp., is a synthetic rubber-replacing material of high sulphur content owing its birth to early experimental work with mixtures of ethylene dichloride and sodium polysulfide. In commercial production since 1931, it is now made in three basic types of distinctly different characters. In commercial production, the material is synthesized from sulphur, salt, and natural gas.

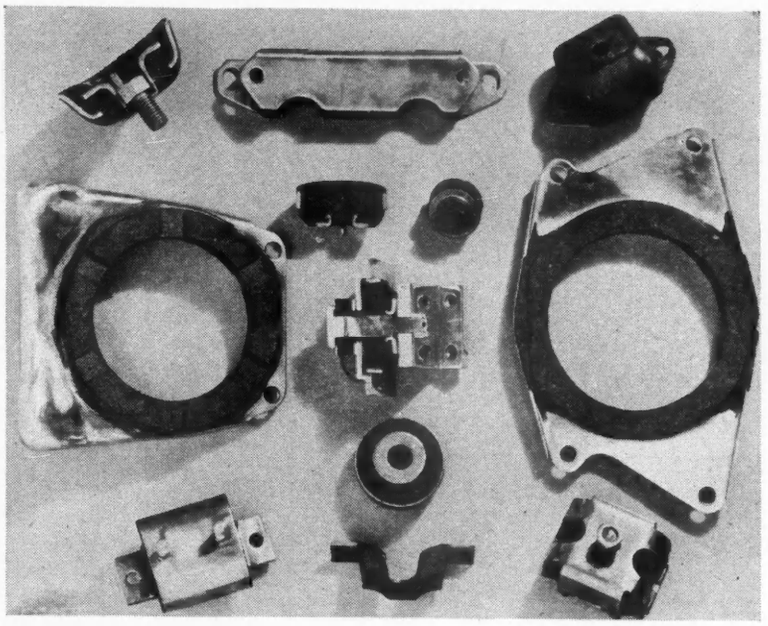
According to its manufacturer, Thiokol has the following unique advantages:

1. Thiokol is oil-proof. Long time contact with a few especially vitriolic solvents swell it slightly, but in every other case it is unaffected by solvents. For example, it stands benzol blend gasolines.

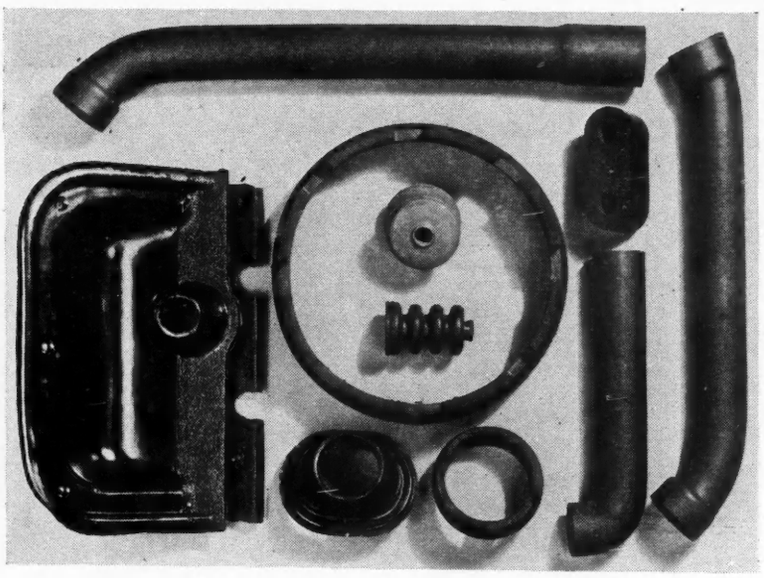
2. Thiokol resists sunlight, eliminates "sun checking."

3. Thiokol resists heat and cold better than rubber. Underwriters' tests show that at 35 degrees below zero Fahrenheit, Thiokol paint spray hose gives no sign of cracking.

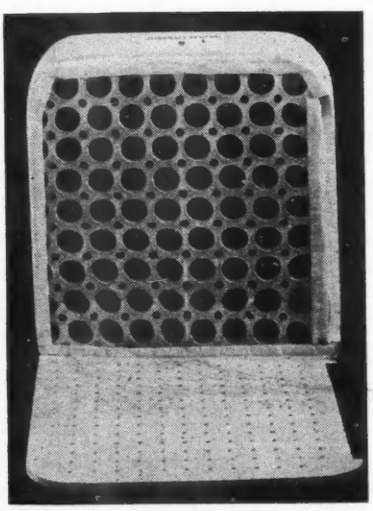
4. As synthetic rubber is used largely for hose, Thiokol's lack of swell is important in minimizing friction resistance. It has strong dielectric properties.



Group of representative Firestone motor mountings for passenger cars and trucks. One of the mounts is a 1938 design for truck diesel support which is said to completely absorb diesel engine vibration. Lower left hand corner shows section of patented construction in which the sheet metal stampings are so arranged as to contact and limit tension loading on the rubber



Group of novel molded parts developed by Firestone includes three large all-rubber hose connections which eliminate the usual angular metal fittings and, in addition, comprise the housing for the thermostat. The large ring in the center is a 12 in. Neoprene oil retainer for a large tractor axle. The rectangular piece is a molded cover used to enclose a large opening in a passenger car dash

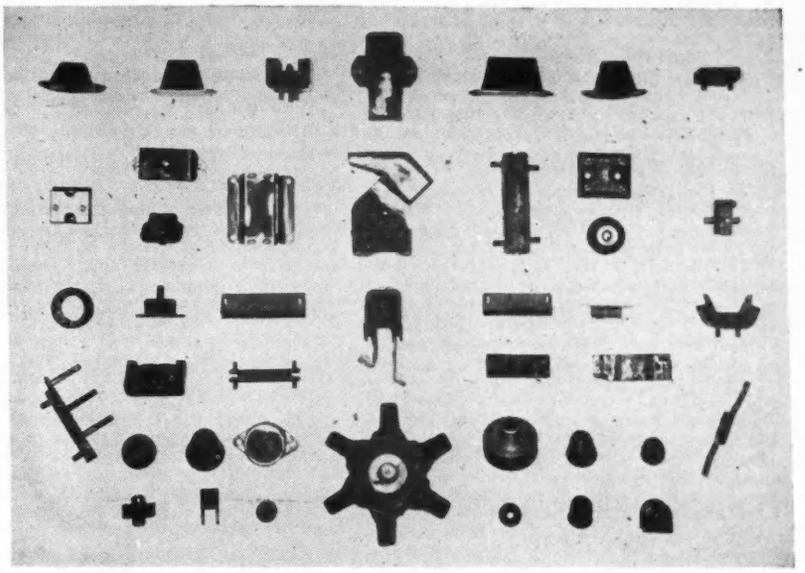


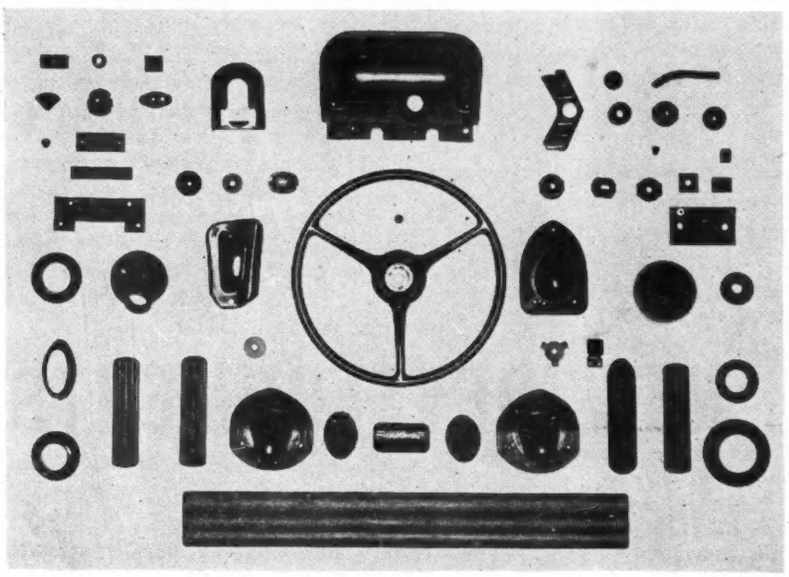
Looking at under side of Mishawaka seat cushion, showing detail of perforated base board

b. The availability of Thiokol molding powders enables oil-proof parts to be made with speed and with the economies incident to plastic molding.

Major applications of man-made rubber in the automotive industry include the following:

Paint spray hose
Gas hose to carburetor
Oil seals
Grease guns
Gas pump diaphragms
Gasoline tank filler neck hose
Ignition wire
Hose from gasoline tank to fuel pump
Hydraulic cups (Booster brakes)
Grease hose





Miscellaneous molded rubber parts being produced by U. S. Rubber Products, Inc., with a group of miscellaneous engine supports in current production at upper right

Drop cord for garages
Gasoline tank grommets, windshield wipers, engine mounts where particularly oily conditions exist.

Bonded rubber-to-metal parts are the product of new techniques that have been developed commercially by the leading producers in the rubber industry. For a very brief statement of the basic steps, we give you the following outline taken from a recent article by the author in AUTOMOTIVE INDUSTRIES, describing the method used by U. S. Rubber Products, Inc. Briefly, the outline is as follows:

1. Production of raw or unvulcanized rubber compound.
2. Brass plating of the metal forms.
3. Assembly of unvulcanized rubber molding with metal parts.
4. Vulcanizing operation.
5. Trimming of flash and finishing operations.
6. Final testing and inspection.

Elsewhere in this article we show a group of photographs illustrating the nature of production equipment used by U. S. Rubber Products and Firestone Tire & Rubber Co.

Physical Properties Automotive Rubber

(Courtesy Firestone Tire & Rubber Co.)

Characteristics	High Quality Motor Support Stocks	Typical Bumper Stock
Durometer Hardness (Shore Type A)	30 to 60	50 to 60
Tensile strength lbs./sq. in.	2500 to 3500	1500 to 2500
Modulus at 400% lbs./sq. in.	225 to 1800	1000 to 1200
Elongation at Break — %	600% to 800%	500% to 600%
*Compression Set (ASTM)	10% to 20%	20% to 30%

*Compression Set—ASTM D-395-36T constant load method-Sample—1 sq. in. (circular) ½" thick. Load 400 lbs./sq. in.

Design Elements

Hirshfeld and Piron, in the ASME paper mentioned earlier, give the following brief summary of the unique properties as well as limitations of molded rubber as a basic material in mechanical engineering:

"(a) Rubber offers comparatively small resistance to change of shape under the action of small external forces. For example, when strained in tension a comparatively small force is required to double its length.

"(b) It is unique among materials used by the engineer in that it permits deformations of relatively tremendous magnitude. Extension to double the original length is a common occurrence and it is a fact that many compounds can be stretched to five or six times the original length and some to ten times.

"(c) Its Modulus of Elasticity is low for

tension, compression, and shear. It follows that it is deformed through relatively large distances by comparatively small forces in all three possible methods of loading.

"(d) In spite of its low compression modulus, it is an almost incompressible material in the same sense that water is. This means that if completely enclosed it does not yield appreciably to compressive forces.

"(e) It has to a great extent the characteristics of a liquid, for which Poisson's Ratio would be 0.5. The value of this ratio for rubber approximates closely 0.5 for small deformations. For very large deformations there is a marked departure from this value indicating that the material departs more and more from the true liquid condition.

"(f) When held under a constant load of the magnitude used in practical engineering work, compounded and vulcanized rubber undergoes a continuing deformation. The rate of deformation is rapid at first and then decreases gradually with time.

"(g) It follows from the above that the shape of the stress-strain graph obtained when testing rubber will vary with the rate at which the load is applied and with the total time during which the rubber is held in a strained condition. A very rapid application of load and an early release will produce the minimum deformation because of the comparatively short time during which drift can occur. Larger deformation for a given load can be obtained by slow application and long duration.

"(h) The stress-strain graph obtained when unloading from such loads as are used in engineering work does not coincide with that obtained when loading.

"(i) There is another and closely associated phenomenon known as "elastic after-effect." When a deformed specimen is unloaded it does not immediately return to its original dimensions. The loop obtained when a complete stress-strain cycle is plotted does not close.

"(j) A further phenomenon which may be designated 'accommodation to load' is of importance. If a sample of rubber is loaded and then unloaded as during normal testing in tension, compression, or shear, and if this is repeated several times in succession each successive cycle will usually give results different from those of the preceding cycle. The rubber will be stiffest for the first cycle and successively less stiff for each succeeding cycle.

"(k) The elastic properties of rubber compounds are very sensitive to temperature. In the range between O F and 720 F, which for practical purposes is a comparatively narrow one, they frequently vary widely. The relations are quite complicated and exception can be found to almost any sweeping statement."

Needless to say, the present commercial development of rubber-to-metal parts is the result of much intensive laboratory research. The end product of this research work was discussed in AUTOMOTIVE INDUSTRIES some time ago by J. D. Morron, manager, Motor Products Development, U. S. Rubber Products, Inc. The following summary of the progress to date is taken from his article:

"1. Adhesion of rubber to practically any metal except Dow metal and magnesium alloy. This includes various types of steels, cast iron, aluminum, lead, zinc diecastings, and certain types of stainless steels.

"2. Adhesion of rubber to metal without the use of copper or copper alloys, such as brass. This is an advantage in certain cases where it is not desirable to have copper or brass present.

"3. Adhesion of rubber to metal, using a metal plate which can be given a bright finish.

"4. Adhesion of rubber to metal in any shape which can be molded. This is of considerable importance, due to the fact that certain shapes which may be desirable from the standpoint of construction, are impossible, or at least very difficult to plate in ordinary processing.

"5. Adhesion of Neoprene to metal. Neoprene, the new oil-resisting synthetic rubber, can be as firmly adhered to metal, as rubber."

While it would be impossible to analyze the design features of the gamut

(*Turn to page* 264, *please*)

Automotive *Materials* NEW DEVELOPMENTS

Report on New Blue Pigment

A comprehensive laboratory report on the characteristics and applications of Syan Blue B, a product of what is said to be the first new blue pigment in more than a century, is being distributed by Ault & Wiborg Corp., New York City. Contained in this report are results of tests and studies carried on for nearly two years in the research laboratories of Interchemical Corp., parent company of Ault & Wiborg.

The pigment from which Syan Blue B is derived is the new phthalocyanine compound discovered a few years ago by two Swiss chemists. Research in Germany and in England led to commercial development of the compound. The pigment is now being used in the manufacture of industrial finishes, lacquers and enamels, printing inks, and other products. It is said to be ideal for automobile finishes where alkali resistance and a non-fading blue are required.

Tests indicate Syan Blue B to be fast to light and heat, to acids, alkalies, and limes. It is insoluble in oil, in spirits, and in nitrocellulose solvents. Characterized by high tinctorial strength and brilliance of shade, the color of Syan Blue B is reported to be well adapted to all types of finishing uses. As a rubber coloring material it has many uses, since the pigment withstands vulcanizing and when used in a finish, it resists wear.

Colloidal Graphite in Rubber Lubricant

George F. Willson, Cleveland sales representative of the Acheson Colloids Corp., has been granted a patent on a composition, of which colloidal graphite is an important constituent, designed for rubber lubrication. The patent has been assigned to the Acheson Colloids Corp., Port Huron, Mich.

Lubrication of rubber parts on automobiles and other mechanisms has presented something of a problem because of the softening action of the usual lubricating agents and compositions. It is said that effective and lasting lubrication of rubber mechanical elements may be obtained by the use of the lubricating composition developed by Mr. Willson.

Magnesium Base Die Casting Alloys

The Doehler Die Casting Co., Toledo, has added magnesium base alloys to its list of die casting alloys which includes tin, lead, zinc, aluminum and copper base alloys. The Company has standardized on three magnesium alloys having a tensile strength of up to 35,000 lb. per sq. in. and an elongation of up to 10 per cent, although other alloys are also available to meet special service requirements.

Upholstery Fabric for Heavy Duty

Two large manufacturers of trucks have adopted "Cavalon," a comparatively new heavy-duty upholstery fabric for seat cushions and backs, which is being produced by the Fabrikoid Division of E. I. du Pont de Nemours

& Co. for use on 1938 models. This fabric was introduced to fulfil a need where tough, water-proof and sun-resisting material is required.

The material is a rubber upholstering fabric, though it does not resemble rubber. It is said to have an extremely tough surface and great tensile strength.

Cold-Forming Improves Welding Electrodes

Two improvements in standard tapered spot welding electrodes have been made by the Electroloy Co., Inc.. New York.

To supplant conventional machined spot welding tips, Electroloy offers electrodes cold formed under great pressure. The cold forming is said to produce a finer, more uniform grain structure with an additional 10 to 12 per cent increase in hardness. Advantages claimed are: a minimum deformation of the electrode with resultant increase in number of spot welds per tip.

Electrodes are also plated with a thin electrically conductive coating of a special alloy highly resistant to oxidation. This is said to result in less heating of the electrode and consequently less softening and deformation, providing longer electrode life.

Stainless Steel Soldering Flux

The Ruby Chemical Co., Columbus, Ohio, has announced a new stainless steel soldering flux. Characteristics of the new flux, as reported, are that no special soldering equipment or solder are needed and that it does not give off offensive odors or burn when in contact with hands.

Paper Coated with Koroseal

Protection of exposed surfaces of machinery during shipment is now offered through the development by the B. F. Goodrich Co., Akron, of a koroseal-coated paper which is acid, oil, air, and light resistant. Koroseal is a rubber-like substance said to be impervious to common deteriorating agents.

Controls Bacteria in Air-Conditioning System

In many types of air-conditioning systems economy requires re-use of water for washing or scrubbing filtered air before it is returned to the rooms being conditioned. Considerable amount of organic matter from recirculated air is introduced into recirculated wash-water, providing sufficient food material to allow bacteria to grow and increase rapidly. Due to this, algae and slime growths accumulate on surfaces in contact with water, and interfere with efficient operation of the system. Furthermore surfaces of coils used for heating and cooling air also accumulate deposits and reinfect washed air, so that air washed with water of high bacterial content or contacting bacterial growth on surfaces, becomes a carrier of infectious organisms detrimental to health.

Oakite Products, Inc., has developed a material which when added to recirculating water used to wash or scrub air keeps wash-water sterile and prevents growth of slime and algae deposits in the system. The material, trade-named Oakite Airefiner, is said to be completely soluble, transmit no odor to water or air, and to provide a stable colorless solution that is safe and non-toxic.

It is non-corrosive to metal surfaces and helps to prevent water scale formation.

Synthetic Finish for Fast Production

Excellent results in large scale production—attributed in the main to shortened baking time—are being obtained with an air-drying synthetic produced by the Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J. The following are equivalent schedules: one hour at 200 deg. Fahr.; 30 min. at 250 deg. Fahr.; 20 min. at 290 deg. Fahr.

The finish is resistant to common corrosive influences such as alkaline washing compounds, perspiration, alcohol, and a number of acids. It is available in all colors and clear and, for two-tone or stencilling work, multiple coatings require one bake for one hour at 275 deg. Fahr.

The manufacturer claims for this product, trade-named Roxyn-C, flexibility without softness and unusual adhesion to aluminum and zinc die-castings as well as many other metals.

Addition to Line of Metal Cleaners

An addition to its line of metal and maintenance cleaners has been announced by E. F. Houghton & Co., Philadelphia. Houghto-Clean No. 180, as the new product is called, is a fine powder of low alkalinity which contains soap as well as a mild abrasive. According to the maker, it is free-rinsing and non-corrosive.

It is further claimed that No. 180, having adequate properties of emulsification and saponification as well as mild abrasion, will remove thin films of mineral or vegetable and animal oils mixed with dust which forms the bulk of dirt found on floors, walls, steps of large buildings.

Black Molding Material Withstands Hard Buffing

Molding material called Durez 113 black and especially developed for applications where appearance is important has been brought out by General Plastics, Inc., North Tonawanda, N. Y. Rich black color, smooth lustre, and long draws are claimed for the material by the maker. Durez 113 is also said to permit hard buffing without exposure of filler spots.

Five Months of '37 Tin Production

According to the July issue of the International Tin Research and Development Council's bulletin published by the Hague Statistical Office, world production of tin in the first five months of the current year totaled 75,477 tons of which 87 per cent (65,591 tons) was produced by countries signatory to the International Tin Agreement.

The proportion of the world's tin used in the United States has increased from 42.5 per cent in the year ended May, 1936, to 48.5 per cent in the year ended May, 1937. Consumption of tin in the American tinplate industry increased by 35 per cent to 40,200 tons; tin used for bearing metals by 16 per cent to 3810 tons; tin in solder by 14 per cent to 12,750 tons; tin in bronze, collapsible tubes and foil by 21 per cent to 12,770 tons; and tin for all other uses in the U.S.A. increased by 33 per cent to 10,100 tons.

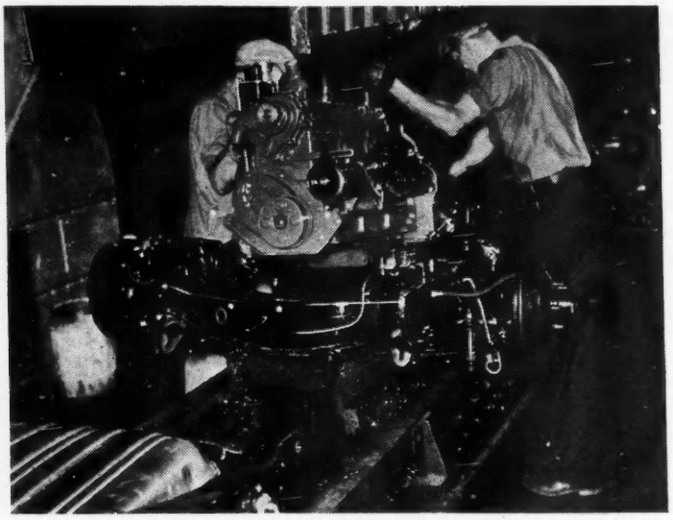
English Publications on Processing Tin

The International Tin Research and Development Council, London, England, recently issued two pamphlets relating to new developments in materials. They are: "The Effect of Cold-Work and Annealing on the Hardness of Some Tin-Antimony, Tin-Antimony-Copper, and Tin-Antimony-Silver Alloys" by R. E. Leyman, and W. E. Hoare's treatise entitled "The Decoration of Tinplate by Printing and Varnishing."

Output of Malleable Iron Castings Gains

Production of malleable iron castings has shown a healthy increase during the past four years. In 1936, production totaled 665,000 tons. Reports for the first half of 1937 reveal operations

(*Turn to page 264, please*)



Production Lines

Lowering the engine into position on the chassis as they move steadily along the Pontiac assembly line. Engines are brought into position at the top of the "motor drop" on the mezzanine above on a conveyor line from the motor test department.

Cooperators

There has been scarcely a case in recent years where the machine tool manufacturers have had as much to do with the development of a new product as in the case of a new plant which we will have the pleasure of describing very soon. Here was an entirely new product —with no precedent in engineering—no precedent in manufacturing. How the machine tool builders aided in working out the production problem and how they succeeded in developing suitable equipment makes a stirring story. Now that it can be told, it will amaze you how a factory organization with the cooperation of outside experts made a commercial reality out of a "watch-making" job. Watch for it in a couple of weeks.

Swing High

It seems the Teetors of Hagerstown are not alone as composers of popular music. We see by the *Chrysler Motors Magazine* that Chuck Comiskey, of the DeSoto Pressed Steel Division is both a pianist and song writer. His latest is "I Guess I'm in Love," a swing tune that has been bought from Chuck by Wurlitzer. It will appear on records and music rolls. Are you listening?

Synthetic Paint

It seems now that several of the independent car producers intend to switch to synthetic paint for 1938 production. Naturally, this means new spray booths and baking ovens. And much of the modern items of this character are being installed. With the increasing use of the ventilated, water-wash spray booths, the industry is providing the best that is available for worker comfort.

Stellite-faced

A recent note indicates that the life of automatic screw machine cams has been greatly increased in a certain machine shop by the use of a stellite-faced wearing surface. The hard-faced cams now last six months where it had been necessary to change the plain steel cams almost daily.

Honing Advances

Factory executives are watching the honing process with an eagle eye to take advantage of the imporant advances being made in the art. In an early issue you will find a description of a new hydraulic honing head that has been adopted for 1938 production by one of the prominent car builders. And later in the year, we will tell you about several novel honing applications used in current tractor production.

Precision Triplets

One of the plants has based the major part of its production process upon three types of precision operations —boring, facing, and indexing. Precision boring is of the familiar single-point cemented-carbide tool variety. Precision facing is an ingenious use of the precision boring machine with single-point cutters used to produce a fine surface in-between obstructions which make it impossible to use a grinding wheel. Precision indexing is new. It's used for line-grinding a series of three or four holes equally spaced within a total limit of 0.001 in. with no accumulative error. The operation is set up on a chucking grinder, using an eccentrically mounted hand-indexing fixture sufficiently off center so that the hole to be bored comes dead on the spindle center.

Engine Tuning

At least the larger service branches could profit by the engine tuning technique developed by Ethyl at Detroit over a period of years. There are two basic ingredients—proper equipment; skilled engine men. The one can be acquired by making the much-needed investment; the other is not so easy since it takes time to develop men who have an appreciation of the modern engine and its variability. Yet the combination can and will produce remarkable results by way of owner confidence and appreciation.

Gear Progress

It is a characteristic of progressive organizations that they leave no stone unturned to take advantage of the latest techniques in their field. This applies particularly in the case of transmission gears. One of the newly tooled plants really gives the gears the benefit of everything that is known. In the green, the gears whether external or internal are hobbed or shaped, then shaved before hardening. In the hard, gear teeth are finish-lapped by various methods depending upon the nature of the job. Fire distortion is almost entirely eliminated by the use of special quenching machines. Only such techniques suffice for the modern silent gear box.—J. G.

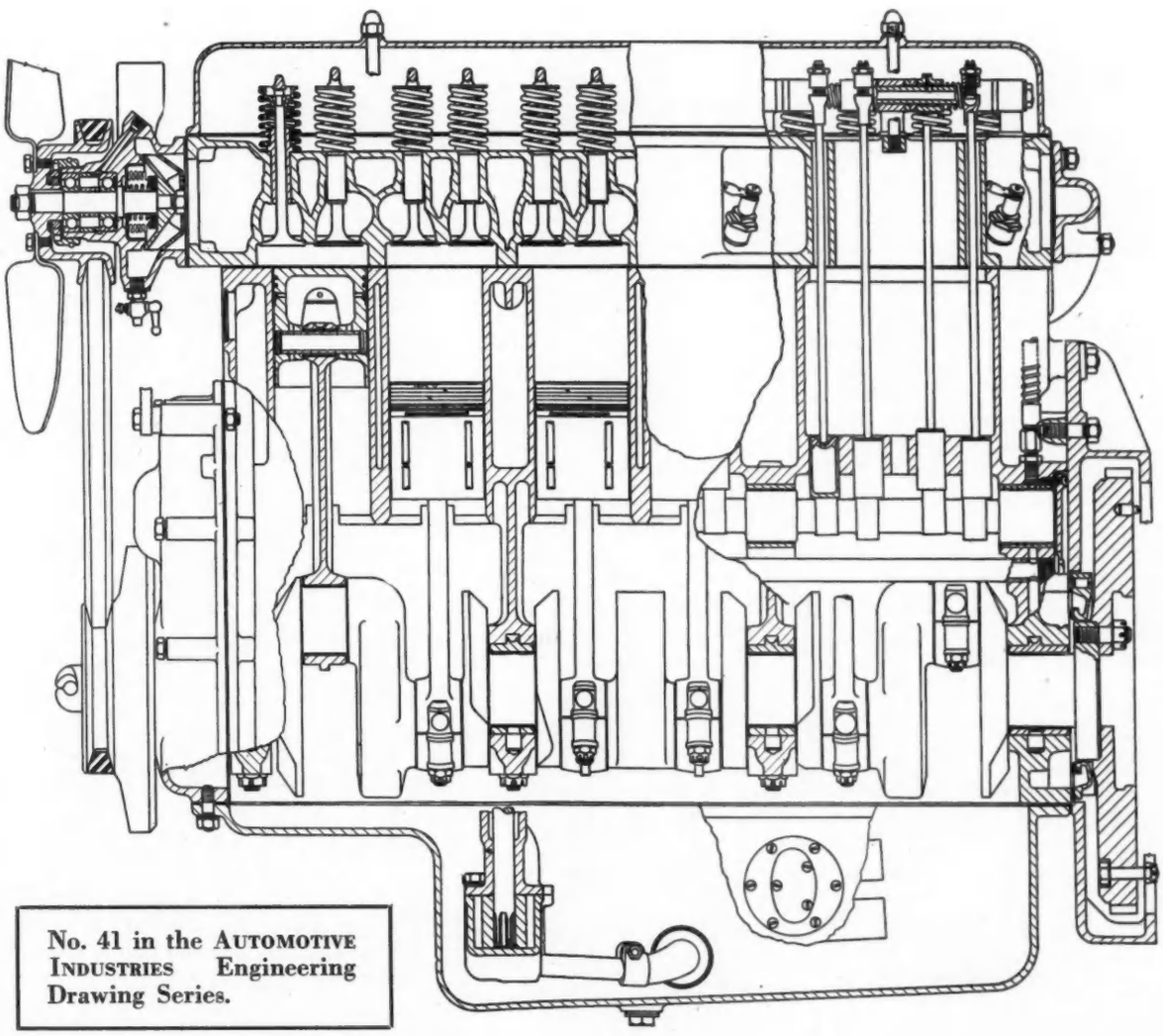
ROVER . . . .

Sixteen hp., six-cylinder passenger car engine manufactured by The Rover Co., Ltd., Coventry, England. Two other models, a 14 hp. and 20 hp., are of the same basic design as the one shown here in section.

Bore and stroke dimensions of this six-cylinder British passenger car engine are 67.5 mm. by 100 mm. (2.65 in. by 3.93 in.), providing a total piston displacement of 2147 cc. (130.96 in.) With a compression ratio of 5.9 to 1, the power plant develops 60 b.hp. at 4200 r.p.m. Maximum b.m. e.p. is 111.5 lb. per sq. in. at 1600 r.p.m.; maximum torque, 97 lb.-ft. at 1600 r.p.m.

Cylinder head and cylinder block are made of cast iron. The counterweighted crankshaft is supported in four bearings; likewise, the camshaft is mounted in four bearings. Crankshaft journals are 2-in. diameter, pins 1⅞-in. diameter by 1¼-in.

(Turn to next page please)



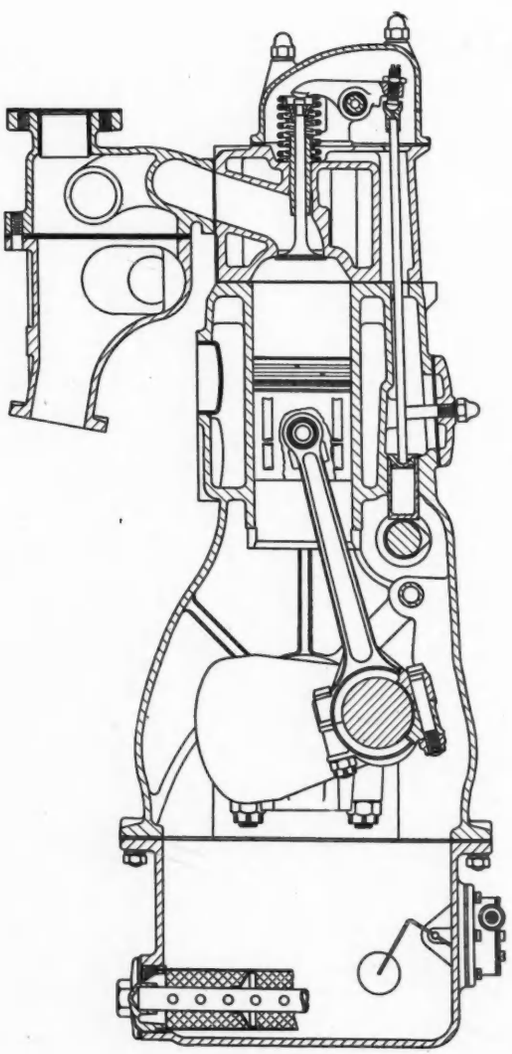
No. 41 in the AUTOMOTIVE INDUSTRIES Engineering Drawing Series.

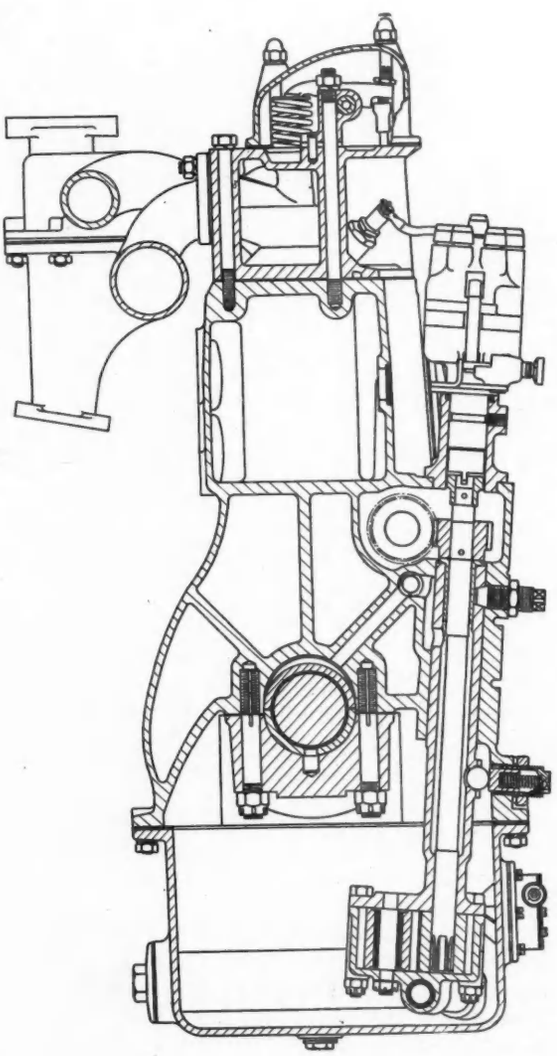
ROVER . . . .

(Continued from preceding page)

The aluminum pistons carry two compression rings and one slotted oil scraper, all above the piston pin. Pressure lubrication is supplied to all bearings, overhead valves and front end chain drive.

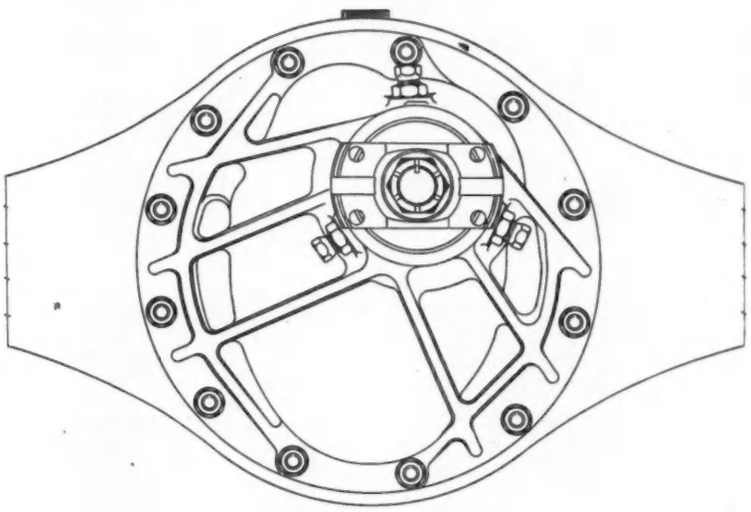
Other elements of the engine include: belt driven pump on ball bearing fanshaft; temperature control by thermostatic valve and bypass; water space between all cylinders; three-point flexible suspension; overhead pushrod valves, mechanical pump feed; downdraft carburetor; coil ignition, hand and automatic control; and automatic voltage control generator.

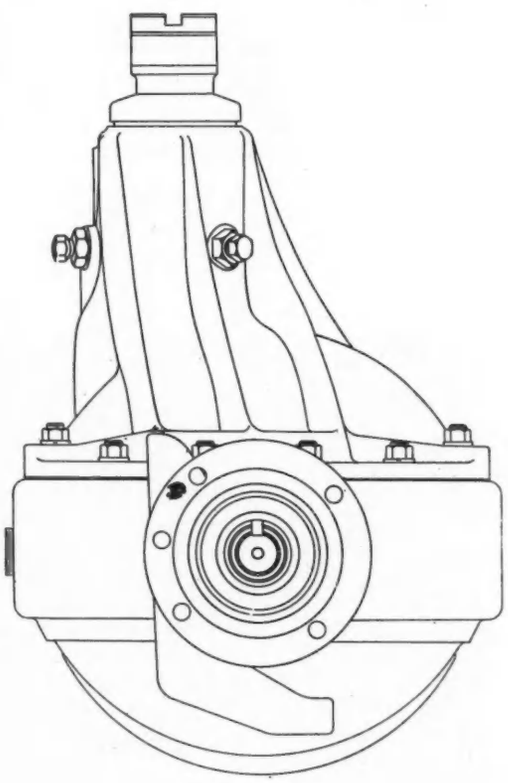


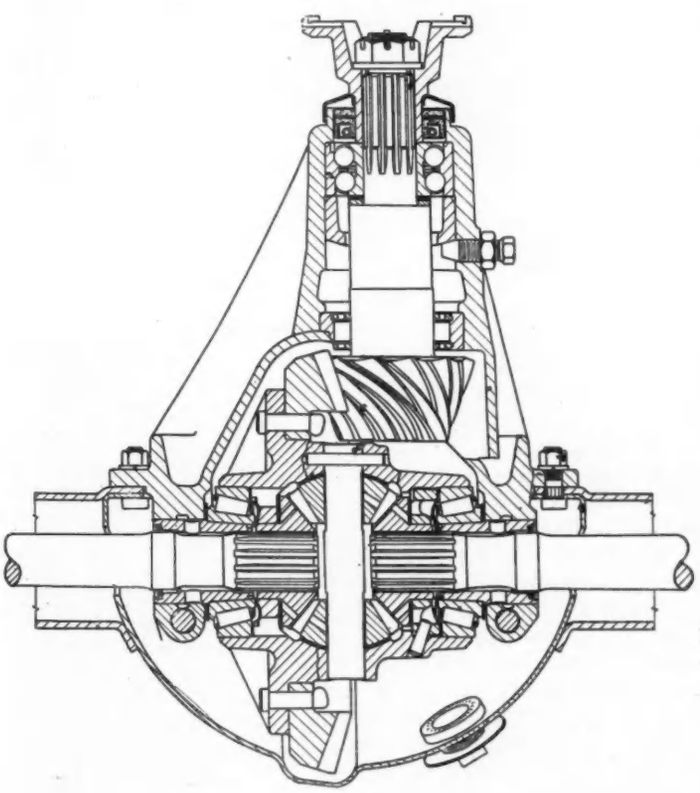


The Cadillac-LaSalle Hypoid

LaSalle V-8, model 37-50, ratio 3.92, teeth on ring gear, 47, teeth on pinion, 12; Cadillac V-8, model 60, ratio 3.69, teeth on ring gear, 48, teeth on pinion, 13.







No. 42 in the AUTOMOTIVE INDUSTRIES Engineering Drawing Series.

JOHN K. CHRISTMAS,
Major, Ordnance Dept., U. S. A.

There is a trend to greatly increase the use of automotive equipment by all armies and it is important that the industry inform itself on what is being done on this . . . . . .

THE United States Army is rapidly becoming an automotive army. This change has been gradual and therefore probably largely unnoticed. Since these changes are of major import to the automotive industry, let us see where we stand today and try to outline what is coming.

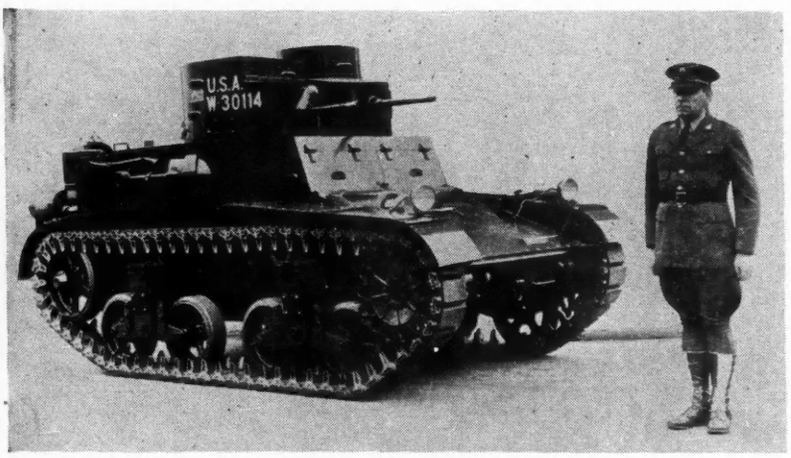


Fig. 1—This tank is of the type principally used in the U. S. Army

Because of the confusing use of the terms "motorization" and "mechanization" in press reports, particularly relating to the war in Spain, let us briefly define these terms. *Motorization* refers to the use of motor vehicles primarily as transportation for men or supplies and is confined almost entirely to highway transport behind the front line of battle. The World War saw the widespread motorization of all the contending armies and today all major armies are almost entirely motorized. Today our Regular Army of 160,000 men operates almost 12,000 motor cars and trucks, while its horses have been reduced in ten years from 44,000 to 25,000. The National Guard has in service about 7500 trucks and motor cars. The procurement and maintenance of these motor vehicles is the duty of the Quartermaster Corps of the Army.

Mechanization covers broadly the use of machinery to increase or replace the fighting power of the combat soldier. More specifically, the Army uses this term to describe the use of armored and armed motor vehicles as fighting machines, to do on land what fighting airplanes do in the air and warships do on the sea. The furnishing of mechanized combat vehicles to the Army is a duty of the Ordnance Department

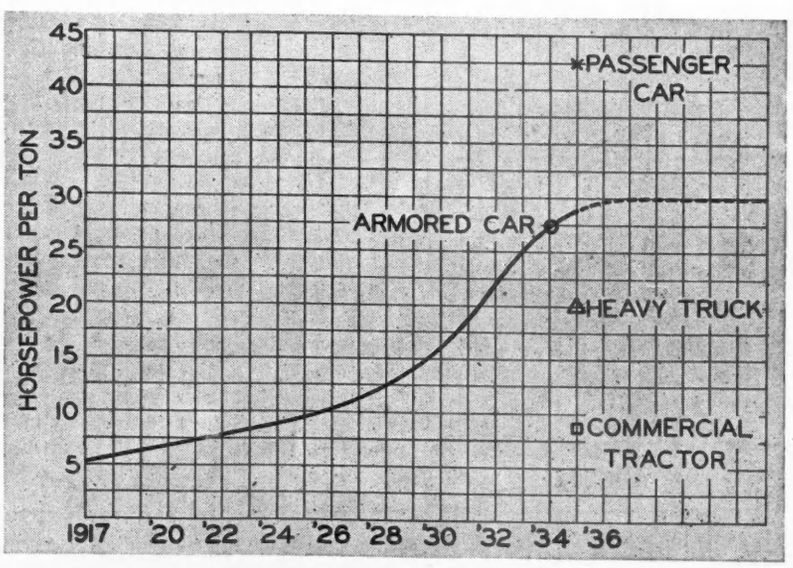


Fig. 2—Development of power requirements in tanks 1917 to 1935 and how it compares with commercial vehicles

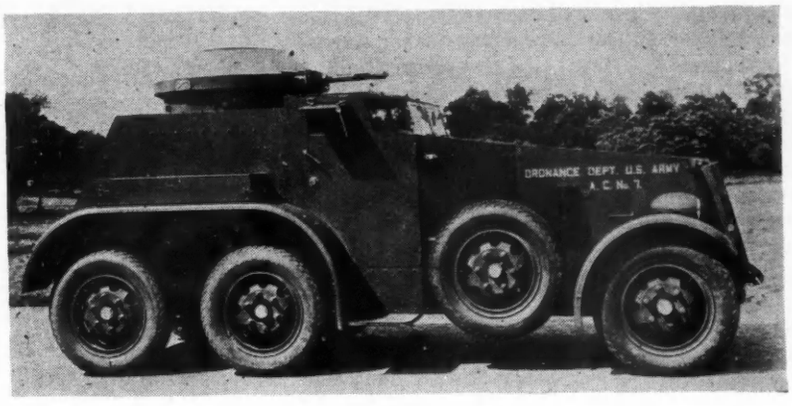


Fig. 3—Six-wheel armored car

The Combat Vehicle

Fig. 4 — Car designed for scout duty

of the Army. This is a later development than motorization, although a small beginning was made in the World War by the introduction of the fighting tank by the British. All the contending armies by 1918 were using small numbers of tanks, but the armistice was signed before the tank had been well developed technically. The manner of using the tank in battle naturally lagged considerably behind its technical development so that the armistice found the tank barely accepted in good military society.

Probably because necessity is the mother of invention, those nations which suffered most casualties in the World War began in the early '20's to think of a method of warfare which would save man-power by using machines to bear the brunt of the fighting. This idea, which was then termed "mechanization," was principally fostered in England, the birthplace of the tank. General F. R. C. Fuller of the British Army and Liddell Hart, a military historian, were and are major prophets of this movement. While the British were the leaders in this logical evolution of land warfare, now all armies are mechanizing at an increasingly rapid rate which is retarded only by the availability of funds. The form which mechanization is taking varies somewhat from country to country, depending on such factors as the industrial facilities of the nation, the most probable scene of war and the tactical ideas of its military leaders. It is significant that Germany, the only nation which had much experience fighting *against* tanks is a leader in mechanization.

The backbone of all mechanization is the tank, which broadly speaking is any automotive vehicle which carries guns, armor and men; *and which can travel on the battlefield.* Long experience has shown that only a track-type or caterpillar vehicle can be depended upon to negotiate most of the rough and roadless terrain of the battlefield, hence we may restate our definition of a tank as follows: a track-type automotive vehicle for carrying fighting men and their guns into battle *under the protection of armor.* You will remember that one of our pioneer fighting men once correctly stated that the way to win a battle is "to get there firstest with the mostest men." The engine and chassis of the tank get you there first and the armor plate insures that you have most men left alive when you meet the enemy. However, since the World War complaint wasn't that the infantry got forward too slowly but rather that very few of them got forward at all, it is well to bear in mind that the armor plate which it carries is the prime quality of the tank.

If you have read this far, you might well say—so what has this to do with the automotive industry? And the answer is: a great deal more than is generally believed. So far as the Army's requirements for motorization go, our enormous automotive industry can supply complete vehicles for cargo or personnel transport, virtually from stock in most cases. Unfortunately, the automotive industry produces no commercial vehicle which even approaches a modern tank or can reasonably be modified or adapted as a tank. The tank, as well as some other combat vehicles described below, is therefore a special development carried on by the Ordnance Department in a field which has no close commercial counterpart. While this is true of the tank as a whole and as regards some of its special parts, many of the components of a tank are either of commercial origin or are special developments from related commercial automotive units. This is true of the following major units: engines, engine accessories, clutches, transmis-

sions, instruments, brakes, universal joints, electric systems, lubrication, rubber tires, ball and roller bearings. The work of the Ordnance Department is to develop the special components, such as high speed tracks, steering, suspensions and armor plate; and then to integrate and synthesize all these with guns and armor into a complete fighting machine.

Fig. 1 shows the tank principally used in our Army today. This machine was designed by the Ordnance Department, built at Rock Island Arsenal, Illinois, and tested at the Army's modernly equipped automotive testing plant at Aberdeen Proving Ground, Maryland. While much of this tank is manufactured at Rock Island Arsenal and the tank is assembled there, about 65 per cent of its components are of commercial origin. Further, the Department is afforded generous cooperation, both formally and informally by the automotive industry. One form of this is the Ordnance Advisory Committee of the Society of Automotive Engineers, which meets from time to time to assist the Ordnance personnel with their problems. Some idea of the problems involved may be had from a comparison of a modern tank with its nearest commercial counterpart, a heavy commercial track-type tractor. The tank must have a top speed of 25 to 50 miles per hour as compared to five or six miles per hour for the tractor; the tank carries a dead but "payload" of armor amounting to 25 to 40 per cent of its gross weight while the tractor carries virtually nothing; the tank must be capable of long fast movements over improved highways; the tank must have room for two to five men, guns, ammunition, radio equipment and much else; and the tank must have a large built-in fuel capacity. This means that the tank must be built with narrow factors of safety, of highly efficient components using the finest steels and advanced heat treatments. Leading firms in the automotive industry which are currently supplying the Ordnance Department with tank components know how exacting these requirements are. The curve in Fig. 2 shows, for example, the trend in the power-weight ratio for modern tanks and how it compares with commercial vehicles. A modern tank as shown in Fig. 1 is expensive as now produced, but if it were produced in quantities comparable to commercial vehicles this price could be greatly reduced, probably by 30 to 40 per cent.

The mechanization of the Army depends on the tank, in various sizes and types, as its basis. These machines are operated by the Infantry, as it is the mission of the tank either to assist or replace infantry, the "queen of battle." The mechanized cavalry uses a fighting machine known as a "combat car," which is technically a tank. In addition to these "land battleships," the mechanization of the Army requires a number of other combat vehicles and related types as supporting and auxiliary vehicles on the battlefield. These types and their primary uses are briefly as follows:

a. Armored and Scout Cars

These are wheeled vehicles, lightly armored and lightly armed (with machine guns); commercial chassis are often used. Such cars are used for scouting, patrolling and communication work; this requires mainly fast long distance work on roads. The mobility of these cars off roads is limited, particularly in wet weather. Figs. 3 and 4 are examples of these vehicles, in service now.

b. Tractors, Track or Caterpillar Type

These are used primarily for the draft of field guns; all sizes are required, from 1¼ to 11 tons. Commercial tractors are used because of their low cost but their speeds (about six miles per hour) are entirely inadequate. Satisfactory tractors for Army use must have a maximum speed of 15 miles per hour for the heaviest machines and 25 to 30 miles per hour for the medium and light weight vehicles. The Ordnance Department has developed special fast models, which are very satisfactory, so as to have designs available for war production. Since the available commercial tractors are too slow and are not suited to road movements, artillery is now mostly truck-drawn; commercial tractors, carried in trucks or on trailers, accompany the artillery columns for use off roads and when the trucks become mired.

c. Half-track Vehicles

This is a special type, consisting essentially of a light commercial truck whose rear wheels have been replaced by a short suspension and a pair of short tracks which support the rear end and propel the vehicle. Intermediate in both road and cross country performance between a full track vehicle and a wheeled vehicle, this hybrid was developed because it makes available at comparatively low cost and in a short time a fair cross country vehicle having much greater speed than a commercial tractor and the ability to make long road marches. Speeds up to 40 miles per hour are practicable. These vehicles are used as tractors for light artillery and as carriers of personnel and supplies to accompany tanks and combat cars over the bad ground of the battlefield. Fig. 5 shows a typical military half-track truck.

This necessarily brief survey should make clear that the basis of successful mechanization is a track-type chassis capable of reliable high speed operation *on roads and off*, with a reasonable mileage life. The tanks and other combat machines now being furnished are fast and powerful enough; they have a high degree of reliability. The use of rubber has greatly improved tracks but an increase in the life of the tracks is still desirable, particularly so as to reduce operating costs. Next in importance is the development of a proper Diesel engine in order that the danger from gasoline fires (in battle) may be reduced, and to increase the cruising radius of the vehicles without refueling. If the development of the tank follows that of other machines and weapons, as it undoubtedly will, we can expect in the near future very specialized

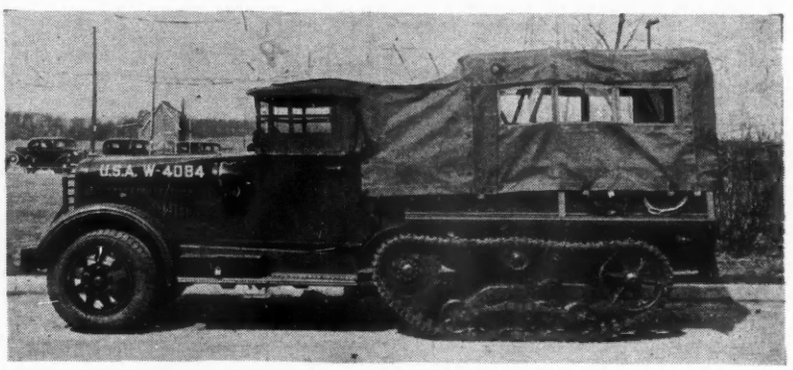


Fig. 5—Typical military half-track truck

COMPARISON OF LOGISTIC DATA OF TWO UNITS OF APPROX. EQUAL FIRE POWER

	Mechanized Cavalry Brigade	Horsed Cavalry Division
Strength—Men	2346	9275
Animals	——	10714
Vehicles (all kinds)	771	910
Class I supplies for 1 day (tons)	81	92 { less 75 tons hay }
(Food, Fodder & Fuel for Men, Animals & Vehicles)		
Gasoline & Oil for 1 day (tons)	76	15
Mobility Factor (Miles travel per ton of Class I Supplies)	1.84	0.27 (less hay)
Length of column (miles)	14.2	19.2
March per day (miles)	150	25
Day of Fire (tons of ammunition)	140	157
Firepower per man (lbs./man)	120	34
Std. R.R. trains for a rail movement	14	57
Ship tons for overseas movement	25,000	135,000

types of combat vehicles, including tanks weighing hundreds of tons. Such machines will present many new problems. However, even today there are in existence in Europe tanks weighing over 100 tons, with armor 2 inches thick protecting a crew of 18 men who operate 6-in. guns and machine guns. Such tanks are slow; about 10 miles per hour is their maximum speed; but these land battleships will not be easy to stop. Since one of the major objections raised (now, in peace) against tanks and mechanization generally is their cost, let us examine this specious argument more closely. If *all* the legitimate costs to the nation of a single soldier (training, pay, equipment, hospitalization, pensions, etc.) are counted it can be shown by simple bookkeeping that *each* fighting man who becomes a casualty costs *more* than a light tank in quantity production. Since there should be little serious argument but that one tank is superior in battle to just one soldier, it pays in dollars and cents to use combat vehicles wherever it is tactically practicable. In other words mechanization means labor-saving machinery applied to the dirty labor of fighting. For example, a conventional infantry regiment and a light tank battalion have approximately equal fire or fighting power. Here's how they compare otherwise: (figures in round numbers)

	Men	Cost of Equipment
Infantry regiment	3000	¼ million
Tank battalion...	500	2 "

So, by spending 1¾ million extra for fighting machinery 2500 men are kept out of battle and off the heavy payroll of battle, with its lingering economic and human consequences. Further light can be thrown on this subject by a brief survey of the table on this page, which compares a typical mechanized cavalry brigade with its approximate equal in fire-power, a typical horsed cavalry division. This table compares these units as to the more important logistic (or supply and transportation) data.

Attention is invited at this point to the fact that I believe there will still be limited uses for non-mechanized units, particularly in defensive operations and in special operations, such as jungle or mountain warfare. We must also admit that artillery and anti-tank guns can do much damage to tanks, but the damage will be much less and less costly than the same weapons can achieve against unarmored and muscle-propelled men. Last, but by no means least, a moving target such as a tank is not easy to hit. And the tanks will be employed in masses at the important points of attack, not sprinkled sparsely over the front to draw fire as was done in the World War.

The mechanization of our Regular Army and National Guard is going on now, gradually but at an increasing rate. Now that the machines themselves have reached a fairly satisfactory technical development and some regiments have been modernly equipped, the proper methods of employment (or tactics) can be developed by tests and maneuvers. And finally, our minds must become mechanized—and minds change slowly. Not only the Army must re-orient itself, but industry and the citizens from whom the Army derives its support must accept this new military concept.

The illustration given here for a tank battalion shows that with the increasing mechanization of the Army the demands, even in peace, for automotive equipment will be very large. In time of war the industry will be called upon to produce combat vehicles by the thousands and tens of thousands —and even more, in my opinion.

Naturally, it is not in the public interest to discuss the engineering details of our developments in a magazine article; suffice it to say that our fighting machines are technically abreast of the times, at least. However, many automotive manufacturers are now working with the Ordnance Department on specific problems on a mutually satisfactory basis and furnishing parts, components or complete vehicles. Such work is done in compliance with designs and specifications prepared by the Ordnance Department. It may reasonably be said that the trend to the greatly increased use of automotive equipment by all armies is such that the forward-looking members of the industry should not fail to take time off from their work now and then to look at what the cloistered military are doing in these piping times of peace. More machines and fewer men will defend America next time the bands play.

Stutz Plan Is Offered

(Continued from page 242)

ing 6 per cent per annum dating from the time of approval.

Associated with this proposed settlement of the Stutz financial problem is the manufacture of Pak-Age cars which have been built by the present Stutz organization after the company had virtually deserted the passenger car field. No provisions are made in the application for the continuance of this manufacture. While not definitely stated at the time, it is expected that a new company will be formed by most all of the present officers of the Stutz company as officers and directors of the Pak-Age car concern. This company probably will buy part or all of the Stutz company buildings for its operations.

The plan will be submitted to Stutz stockholders for approval, although considerable doubt existed at the hearing that this will be required to put the plan into effect. Should examination of the plan and company rules indicate that the referendum of the stockholders is not needed, it is expected that liquidation will be started at once.

Rubber in Current Automobiles

(*Continued from page* 254)

of molded parts, suffice it to say that there are hidden features that represent the product of intensive investigation. There is more to the rubber part than greets the eye. Motor mounts, bumpers, and similar parts, for example, are carefully designed to develop definite physical properties. What the eye does not see are the metal elements that are molded in the rubber and which in themselves constitute an important engineering contribution. Firestone, for example, has worked out the form of metal inserts in such fashion that opposed elements will tend to contact under severe tensile loading, thus holding the tension on the rubber within determined maximum limits.

Sponge rubber cushions present a triumph of the engineering art. If you examine the seat cushion you will find a base plate with perforations that register with the centers of the large cored holes in the cushion. The combination of large holes and the perforations provides the effect of an air spring or shock absorber action by forcing the entrapped air in the large bores to discharge through restriction passages or orifices. The diameter of the perforations in the backing plate can be and is varied to suit the application — larger diameters and freer movement or displacement of air for boulevard ride; smaller diameters with slower displacement for long-distance buses, for example, where varying road surfaces may demand controlled displacement for comfort.

We cite these several examples simply to indicate that molded rubber is not just a rubber part but is in fact a design element possessing definite engineering character.

Future Developments

The remarkable growth of the mechanical rubber applications in automotive design may be taken as an index of future development of rubber in mechanical engineering. From the commercial point of view, there is undoubtedly much that may be done by way of expansion of applications through improved techniques. From the engineering point of view there is an almost unlimited vista of new developments, trammeled only by the existing knowledge of the properties of a new structural material.

Fortunately, mechanical rubber products are things born of the laboratory and improvements are bound to result from the constant activity within the laboratories of the automotive plants as well as of the rubber producers.

UNITED

for *EVERY* internal combustion engine

You, and you, messrs. engine manufacturers, whether you build a ponderous truck for 220 KV transformers or a little garden tractor for garden farmers, can give your customers the great satisfaction and yourselves the greatest sales advantage of United Air Cleaners. Here is illustrated the principle on which all models succeed; intimate mingling of air, oil and abrasives—then thorough separation of clean air from oil and abrasives. A million users attest its correctness.

Hat type for Downdraft carburetors

While compacted vertically to clear between carburetor air horn and hood of any car or truck, this model retains all the efficiency of the deeper ones. Innumerable tests have proved it to eliminate more than 98% of air-borne abrasives.

For Agricultural Engines

This type thrives on dust. Even excessive dirt accumulations in its settling cup leave its cleaning power unchanged. When dust clouds hide the sun, an engine protected by this cleaner still develops its full rated power after months of use; long after less guarded motors have been rebored, then junked.

For Power Garden Tools

Dust from a little garden is just as abrasive as that from a million acres. The owner of a small garden tractor usually can less afford to replace it than can a ranch owner. The sales advantage given by the United Oil Bath air cleaner is tremendous in such a case. Give yourself this advantage.

Write for Detailed Descriptions and Quantity Prices.

United Air Cleaner Co., 9705 Cottage Grove Ave., Chicago, Ill.

Division of UNITED SPECIALTIES COMPANY

AIR CLEANERS

New Developments in Automotive Materials

(*Continued from page* 255)

were at 73 per cent of capacity, which is 16 per cent higher than the figure for the first half of 1936.

An active program of research and development work carried on within the industry has done much to improve its position. Perhaps the most typical example of malleable foundry progress is found in the improvement of annealing equipment. Ten years ago the average annealing cycle was about eight to ten days. Today, due to improved equipment, many plants are annealing in four days, and a few have so perfected their equipment that they are annealing in 36 to 48 hours.

In 1936, a total of 56 per cent of the entire output of the malleable iron industry was used by the automotive industry, approximately 70 lb. of malleable iron castings being used in construction of the average automobile.